MAY 14, 1951

# STEEL

The Weekly Magazine of Metalworking

## Screw Machine PRODUCTS

*everywhere you turn*

—see page 61

**Tooling Up for CMP, p. 53**

**Packaging Machinery Makers Wrap Up Big Year, p. 55**

**Scale Down Planning Costs By Using Models, p. 86**

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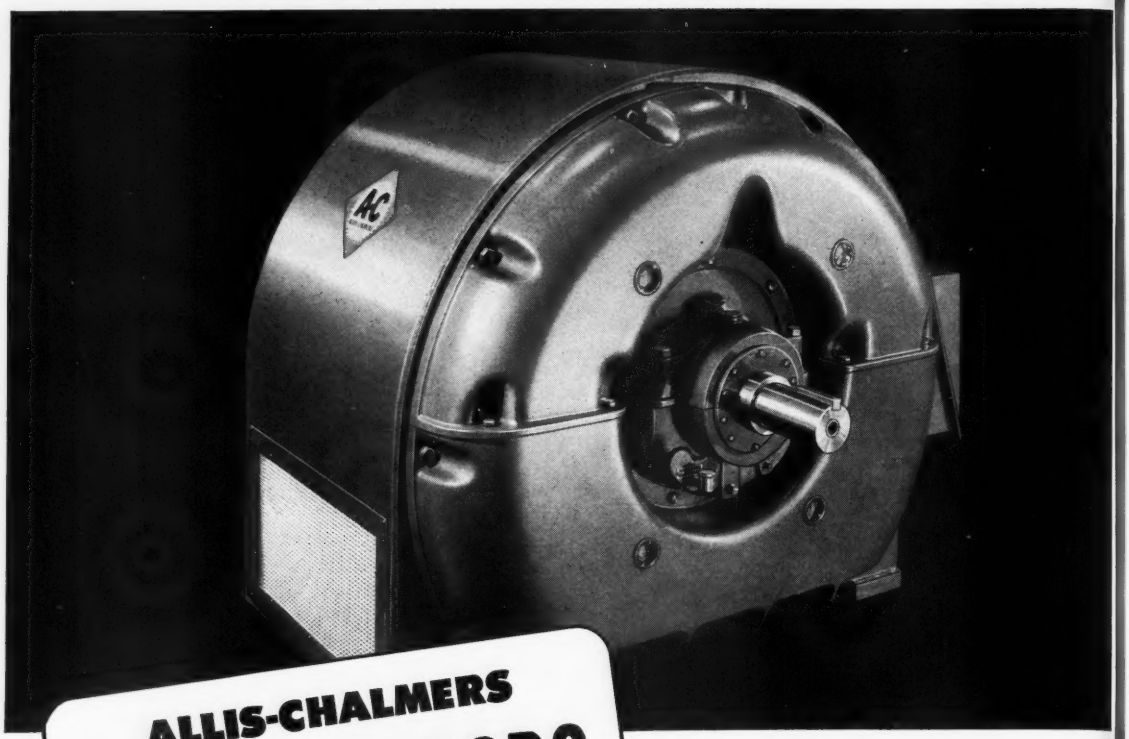


# ALLIS-CHALMERS LARGE MOTORS ...Combine Protection & Accessibility

MAINTENANCE COSTS are dealt a double blow by this new line of Allis-Chalmers squirrel-cage induction motors. First, its protective design features minimize the need for maintenance operations. Then, its planned accessibility cuts the cost of doing the maintenance work.

### How Maintenance is Reduced

In these motors, protection begins with drip-proof construction. But it does not end there. Air discharge openings in the stator yoke are given the added protection of removable louvered panels. Air intakes in the rigid cast iron end shields are located so as to prevent injury to the windings by mishandled tools or other objects. Capsule-type bearing housings protect the bearings and oil supply when the windings are being cleaned. The capsules can remain sealed against abrasive dirt throughout the cleaning operation.

### How Costs Are Cut

This added protection has been achieved without sacrificing accessibility. One man can perform all routine maintenance operations. To check the air gap he simply removes a few screw-type plugs from the bearing end shields.

For cleaning, he removes the upper halves of the end shields and reaches right inside the motor with his vacuum cleaner or air hose. And there is plenty of room to reach up back of the stator core through the air discharge openings in the sides of the yoke.

### Wide Range of Sizes

These modern-design drip-proof (or splash-proof) cage motors are built in sizes from 60 hp at 300 rpm to 2000 hp at 1800 rpm. Ask your Allis-Chalmers representative to show you the details of this exceptional new motor, or write Allis-Chalmers, Milwaukee 1, Wisconsin, for bulletin 05B7542.

A-3409

**ALLIS-CHALMERS**

# SELL IRON and STEEL SCRAP NOW!

**The scrap in your plant, factory, or shop will bring high prices—and help industry get the steel it needs**

TODAY you're hearing a lot about the importance of scrap — iron and steel "junk" that often lies neglected in some obscure corner. Maybe, in your own plant or shop, there's a forgotten heap. Rusting tanks or boilers . . . obsolete machinery, long unused . . . plates, sheets, gears, rails, discarded months or years ago.

If so, put in a call to a scrap man. Scrap's his business; he buys! And he pays good prices!

The ferrous scrap you sell him will find its way to the steel mills—which, today, are hungry for it. Scrap, a truly vital ingredient in the making of steel, is in critically short supply. Millions and millions of tons are needed at once.

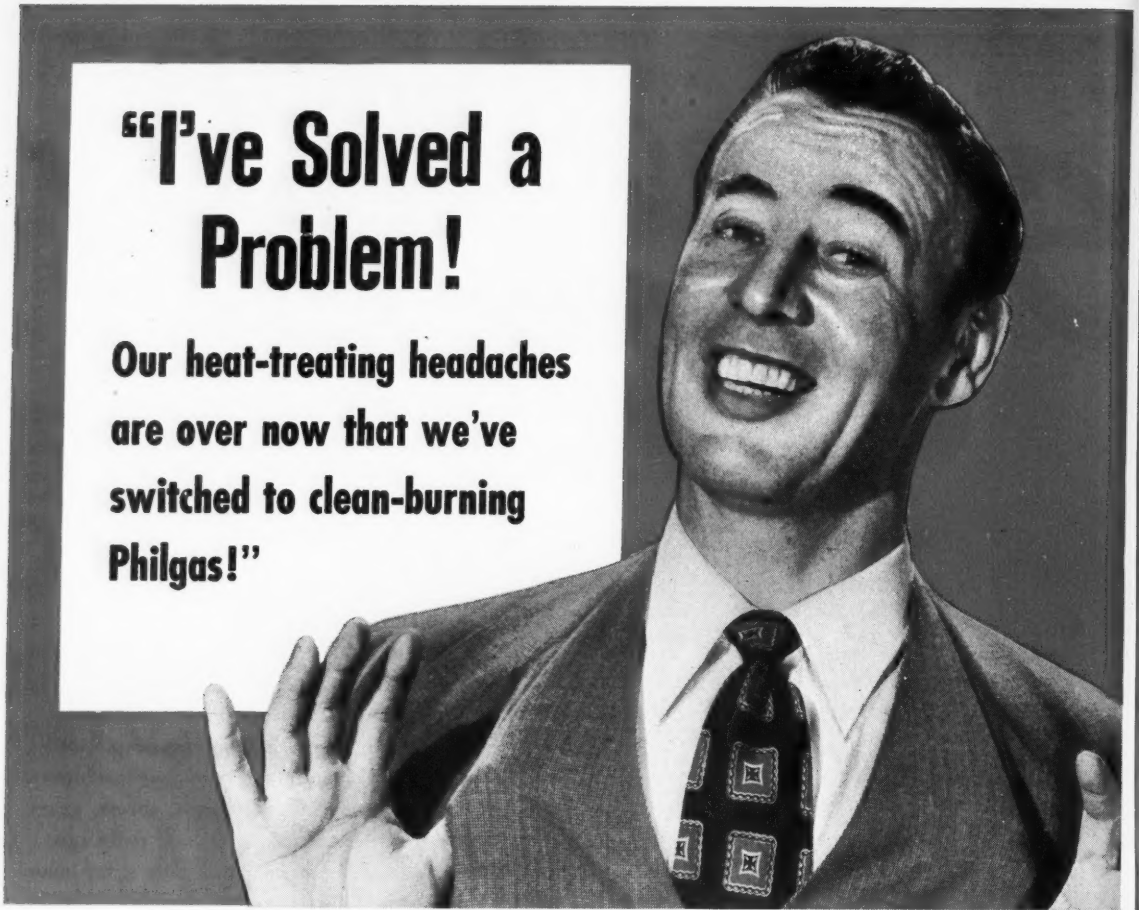
You can help—and help yourself as well—by cleaning out the scrap pile and selling it for cash. Get your scrap in circulation. Get it on the job!

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

**BETHLEHEM STEEL**

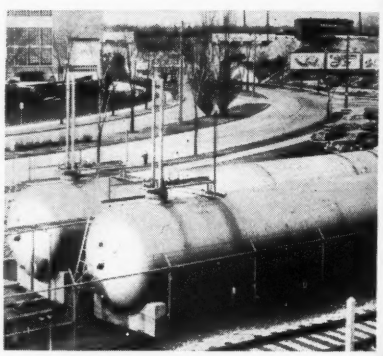
BETHLEHEM STEEL

**For names of local scrap dealers, consult the yellow classified pages of the telephone directory.**




Happy thought! Phillips LP-Gas (Philgas*) gives *dependable* heat, free from gum, tars, resins or other contaminants. There's no cleaner industrial gas! Uniform in thermal value, gravity and pressure, you can count on Philgas for constant furnace temperatures and atmosphere. Automatic operation cuts down on overhead.

To find out why so many manufacturers are using Phillips *66* Philgas, ask to have one of our industrial engineers call at your plant. He can show you how others have saved money by using Philgas.



**Specialists in LP-Gas for Industrial Use**

Phillips 66 Philgas

**A Phillips Petroleum Company Trademark*

# PHILLIPS PETROLEUM COMPANY

**Sales Department • Bartlesville, Oklahoma**

Offices located in Amarillo, Tex., Atlanta, Ga., Chicago, Ill., Denver, Colo., Des Moines, Ia., Pontiac, Mich., Indianapolis, Ind., Kansas City, Mo., Milwaukee, Wis., Minneapolis, Minn., New York, N. Y., Omaha, Nebr., Raleigh, N. C., St. Louis, Mo., Tulsa, Okla., Wichita, Kan.

# Only with B. F. Goodrich grommet belts can you make these savings!

## *Save 3 ways! Investigate today! Write or mail coupon*

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

### *What is a grommet?*

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

### *All cords put to work*

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

### *Better grip, less slip*

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

### *Send for proof*

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

### *They cost no more*

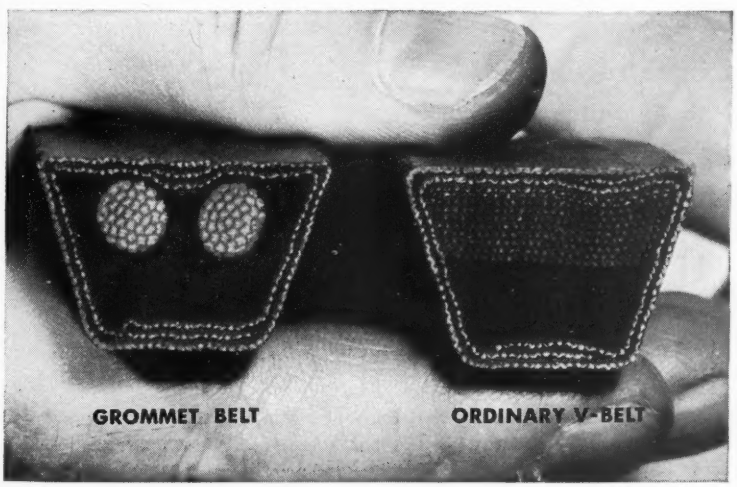
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

*Grommet Belts* BY

**B.F.Goodrich**

FIRST IN RUBBER




**The B. F. Goodrich Company**
**Dept. 5-5**
**Akron, Ohio**

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

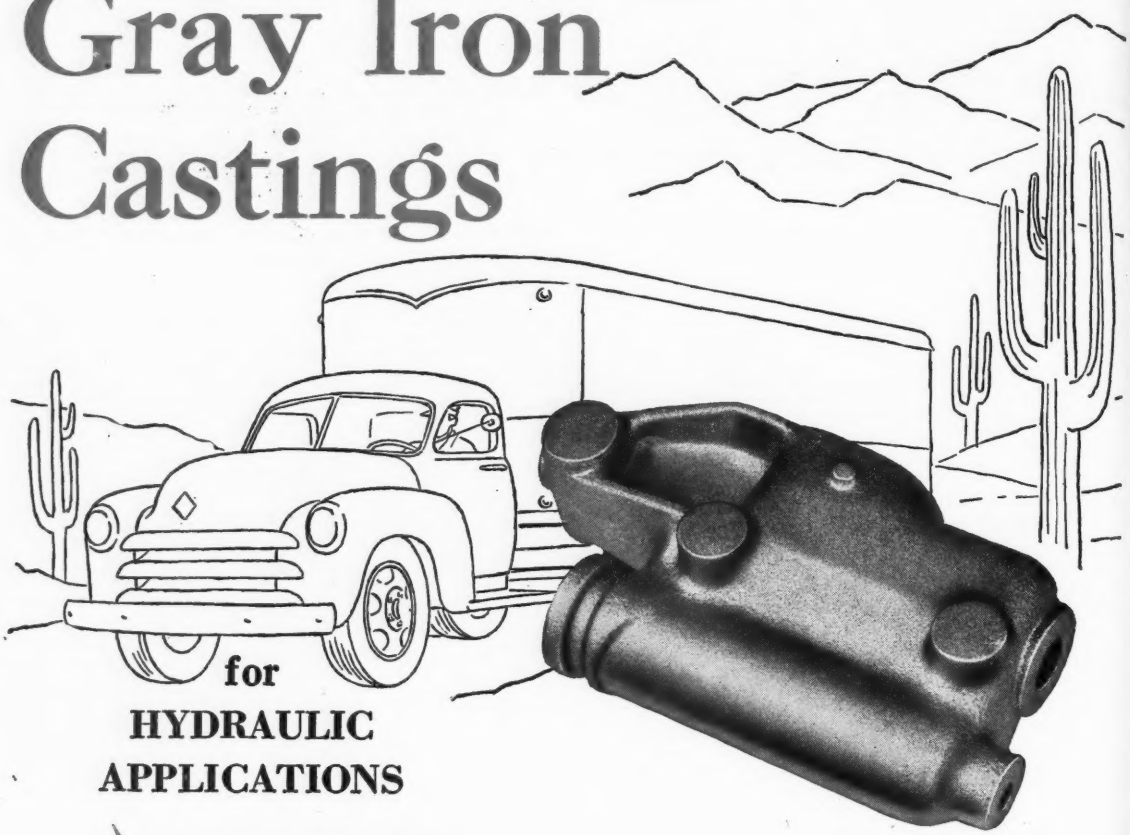
_____

Street Address_____

City_____

State_____

# Eaton Permanent Mold Gray Iron Castings



**for HYDRAULIC APPLICATIONS**

- **Free machinability**
- **Dense, homogeneous structure**
- **Freedom from leakage under pressure**
- **Machines to high, mirror-like finish**
- **Properly annealed; no growth or distortion after machining**

Send for your copy of the illustrated booklet, "A Quick Picture of the Eaton Permanent Mold Process for Producing Gray Iron Castings."

## EATON MANUFACTURING COMPANY

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FOUNDRY DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

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STEEL
The Weekly Magazine of Metalworking

VOL. 128 NO. 20 MAY 14, 1951

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***Next Week*** ... **Will our Transportation System Be Adequate for the Job? ... Metal Spinning Now a Mass Production Tool ... Tons of Conditioned Air for Jet Engine Research ... Sheets Stored in Plywood "Books"**

Published every Monday by the Penton Publishing Company, Penton Building, Cleveland 13, Ohio. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (current issues) 35 cents. Metalworking Yearbook issue $2.00. Entered as second class matter at the postoffice in Cleveland, under the Act of March 3, 1879. Copyright 1951 by Penton Publishing Co.

## New Khaki Drab Supplements Line of Luster-on® Bright Dips

An entirely new type formula is a big feature of Khaki Drab, corrosion resistant conversion coating for use over zinc or cadmium plated work, recently announced by Chemical Corporation, 56 Waltham Avenue, Springfield 9, Mass. This formula offers ease of control and replenishment by additions of the original concentrate. A choice of color is available according to end use desired.

Corrosion protection is extremely high. Independent laboratory tests on flat panels treated with Khaki Drab over .0003-.0004" cyanide zinc plate gave salt spray resistance approximately 300 hours. With current Government specifications requiring 96-100 hours there should be no question on the use of Khaki Drab for U. S. orders.

Luster-on Khaki Drab may be left as a final finish or acts as an excellent paint bond for later organic finishes. In this case it resists attack where the finish is marred or scratched.

## Bright Luster-on® Utility Dips Replace Nickel

In many applications where nickel, chromium or cadmium are taboo, a very creditable substitution may be made with ordinary zinc plate followed by Luster-on Utility Bright Dip. This is the finish adopted after long tests by Stromberg-Carlson, Magnavox, National Lock, G-E Monowatt, American Bosch, Landers, Frary & Clark and General Motors Fisher Body.

Luster-on Utility is daily proving to be a money-saver as well as a lifesaver for those formerly using forbidden finishes. On hardware, radio and electrical parts, refrigerator shelves, wire goods, small tools and a hundred similar applications Luster-on Utility over zinc offers a shining, permanent brilliance at less than 1/5c per sq. ft.

Sample parts sent to Chemical Corporation at Springfield, Mass. will be processed and returned without charge or obligation. Simply be sure to specify if finish desired is Luster-on Khaki Drab or Utility Bright Dip.

*Advertisement*

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Internal Grinding
WHEELS

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TO ORDER . . .
Rapid Delivery

Chicago Internal Grinding Wheels produce better finishes with no sacrifice of wheel life or cutting action. They're your best buy because — they're "tailor made" to your particular specifications and on their way to you within hours after you order.

Better Wheels . . . Faster

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WRITE TODAY for full details on all Chicago Wheel products . . . and *free* sample Chicago Internal Grinding Wheel.

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Chicago 7, Illinois

# Behind the Scenes . . .

## The Cloudy Crystal Ball

We had our own private business barometer, but it's almost undecipherable now. At one time all we had to do was look out our window and gage the length of the line waiting to get into the Cleveland office of the Ohio Employment Service across the street. If there were about 100 people in that line at about noon, on a Monday, we'd guess that STEEL's industrial index would be around 180 on the following Monday. If there were 50 people in the line, our estimate was that STEEL's index would go up to 190. If there was no one in the line, we figured the gage would jump to 205 at least.

We quietly kept track of our predictions for three months and found our error was only 1.4 per cent. We were about to reveal our barometer to the editors who, we thought, could use it as a handy check on their own statistical computations (this week beginning on p. 69) when the whole thing went cockeyed.

For two weeks no one had appeared in the line and we predicted 205, but on the third week we counted more than 100 milling around. Surprised, but confident, we dropped the estimated index to 180. In the following Monday's issue, the editors had it at 216—it has been that or higher for some weeks now. The next week estimate was even further off.

We went downstairs and across the street to check more closely. Lo and behold, the Army and Air Force had opened a subinduction center next door to the employment office. Restless draftees and enlistees were pacing in front of both offices as they awaited their interviews. All of the people we had figured as unemployed were going to be very much occupied soon.

There's a crowd milling around down there every day now, and our barometer is all confused.

## Turn About

We have handled hundreds of requests from industry asking us to give them their standard industrial classification number. That's the number assigned by the U. S. Bureau of the Census to industrial categories in a system widely adopted by metalworking.

It was something of a shock the other day to receive a query about our own number. We had to hunt it up and discovered that the printing and publishing industry is cataloged as 2721.

## TV Survey

Scott Radio Laboratories, television set manufacturer, has just made a survey revealing that 9 out of 10 set owners regularly leave to make phone calls, get refreshments or work in the kitchen during those long TV commercials. If the surveyors had approached us, we could have reported that we also take advantage of that commercial time for a quick trip to the bathroom.

## Lethal Tendencies

We note that American Safety Razor Corp. will operate a shell-loading plant in addition to its regular civilian business of making razor blades. That defense activity is not as far removed from the peacetime operations as one would at first suppose.

We have cut ourselves often enough while shaving (not with American's products, we hasten to add) to know that the lethal tendencies of razor blades, as well as those of shells, are high.

Another domestic product that has surprisingly dangerous properties is under-arm deodorant spray. We know a chap who accidentally squirted some of the stuff in his eye and had to go to the hospital for treatment.

## Puzzle Corner

S. P. Hull of Worcester Stamped Metal Co. was the first one in with the correct answer to the Apr. 30 problem about the cost of a cork. The price of the thing was 5 cents.

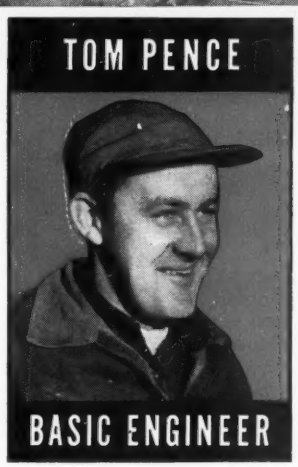
Here's a much tougher one, submitted by William W. Johnson, a mechanical engineer of Cleveland: Al Jones' house is at the center of his circular farm containing 900 acres. He gives to each of his seven children an equal circular farm as large as can be made within the original farm. He keeps as large a circular farm, of which his residence is the center, as can be made after the distribution. What is the area of the farms?

Shrdlu

(Metalworking Outlook—Page 43)

# Basic values behind the trade mark

Service Division mixer feeds tempered Ramset onto conveyor for delivery OVER charging buggies to furnace.




For years Tom Pence, of the Basic Service Division, has spent most of his time in work clothes on customers' melt shop floors.

## SPECIAL SERVICE EQUIPMENT

A FAMILIAR trade mark identifies a dependable product. But quality of product is only one of the values that stand back of the "man with the shovel."

You purchase valuable extras with any of our refractories. On Ramset hearth installations, for example, you benefit from the skilled supervision of the Basic Service Division, as well as from the availability of their special mixing, conveying and impacting equipment.

As a Basic customer, you pay no more for our products because of this service. It is just another plus for your money, another user benefit by which we seek to earn an increasing share of your granular basic refractories business.

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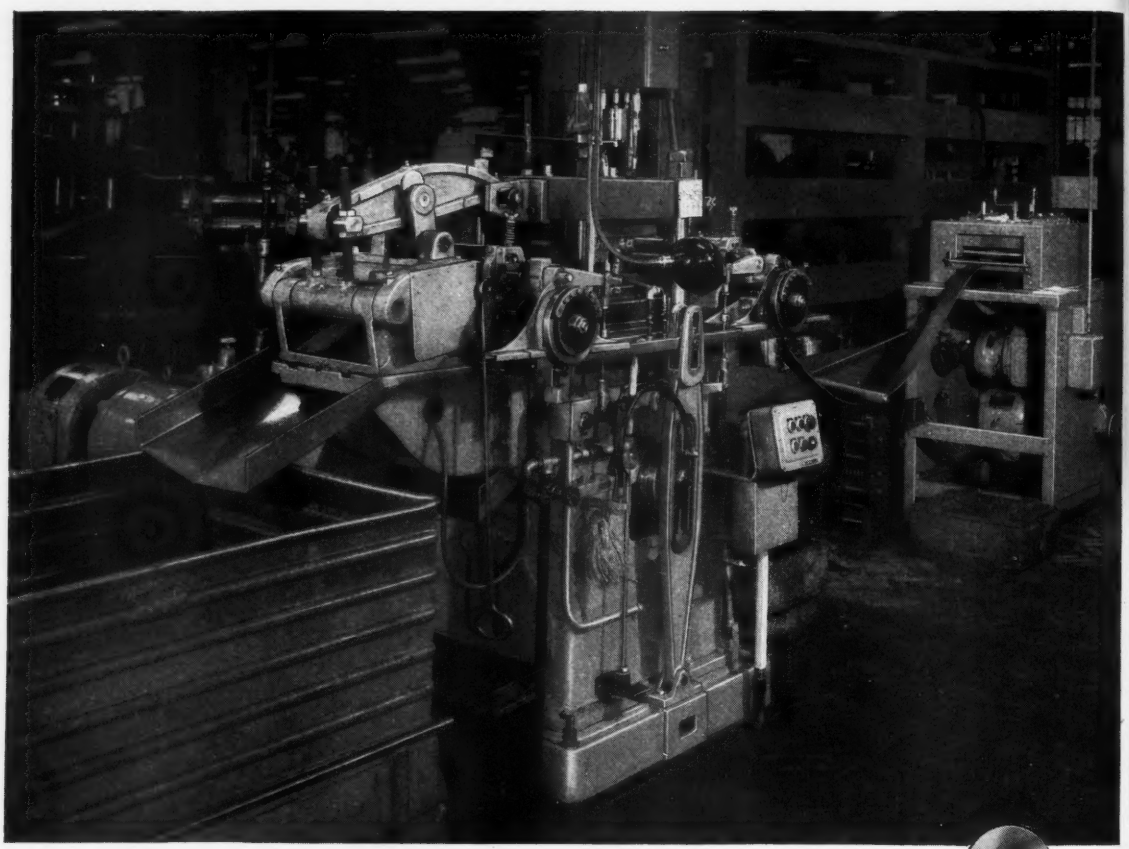
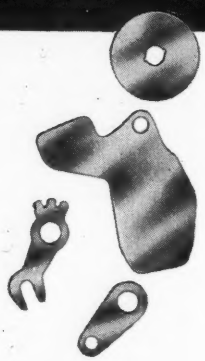


# For National Cash Register which uses

three sizes of Henry & Wright Dieing Machines to produce 310 different parts. Production rates range from 400 strokes per minute on a 25-ton machine to 80 strokes per minute on a 75-ton machine, with one or more completed parts produced per stroke. You can't beat them for long die life, or versatility. Remember this: because of their unique, revolutionary design, only Henry & Wright Dieing Machines give you both high speed and long die life. It's an unbeatable combination.



# Only the best is g

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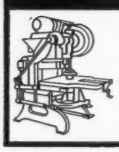

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HARTFORD-EMPIRE CO.
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AUTOMATIC PACKAGING EQUIPMENT

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*Division of Emhart Mfg. Co.*
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PLAX CORPORATION
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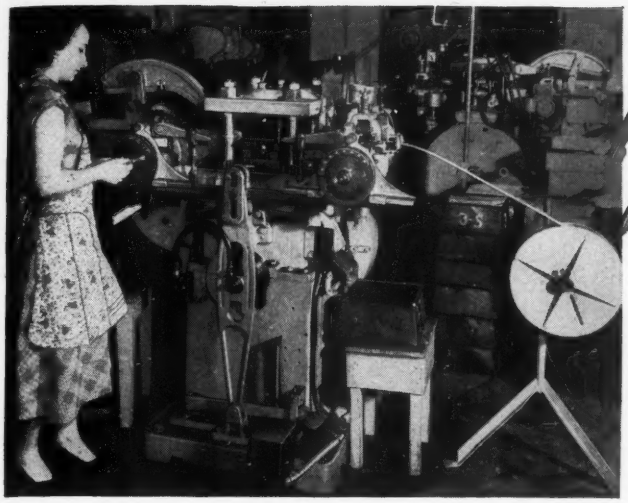
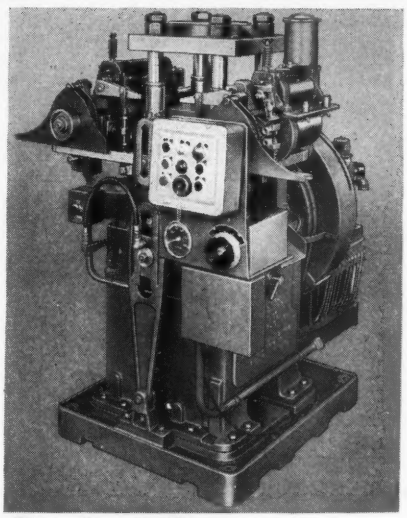
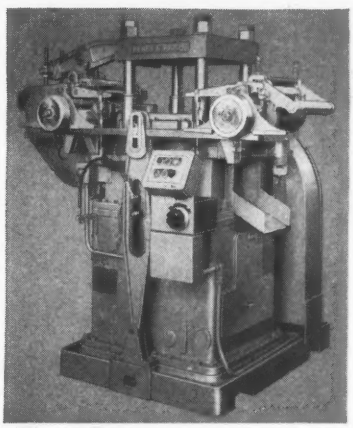


## For The Esterbrook Pen

Company which, from the start, has used H. & W. Dieing Machines to produce a wide variety of components for its modern line of fountain pens. Esterbrook selected H. & W. Dieing Machines because of rigidity of lower platen and four-post guide — and their versatility. Stainless steel clips shown here are produced in combination dies which blank, form and mark.



**For Link-Belt** Company, which uses Henry & Wright Dieing Machines to produce parts for power transmission chain. Here is additional proof that you can depend upon H. & W. machines for speed, precision and sustained efficiency in the production of metal stampings.



## For Addressograph-Multigraph

Corporation where complete-per-stroke production on Henry & Wright Dieing Machines keeps production rates high and costs low. Leading companies know they can get the performance they need with Henry & Wright machines.

# good enough

**FACT PACKED CATALOG**
Complete descriptions of all Henry & Wright Dieing Machines. Write: Henry & Wright, 442 Windsor St., Hartford 5, Conn.

Henry and Wright

H&W

**HENRY & WRIGHT**
Division of Emhart Mfg. Co.

# On cut-off jobs...

## This is the saw that SAVES
## TIME... MONEY... MANPOWER

Wells No. 8 with wet cutting system

## WELLS No. 8 METAL CUTTING BAND SAW

WHETHER it's for production, general utility or both, the Wells No. 8 is an investment that will pay for itself.

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**MONEY SAVINGS**—First cost is low; operating costs are low . . . band type blade removes minimum stock, cuts accurately to minimize rejects.

These savings can mean a lot in any shop . . . why not find out what they can mean to you. The Wells No. 8 has a capacity 8" x 16", rectangular, 8" dia., rounds. It is powered by a heavy duty ½ H.P. motor. Other sizes also available. For automatic repetitive cutting of identical lengths, the Wells No. 8 can be furnished with the Wells-O-Bar Feed Master. See your Wells Dealer for further information or write for literature.

Wells saws

Wells

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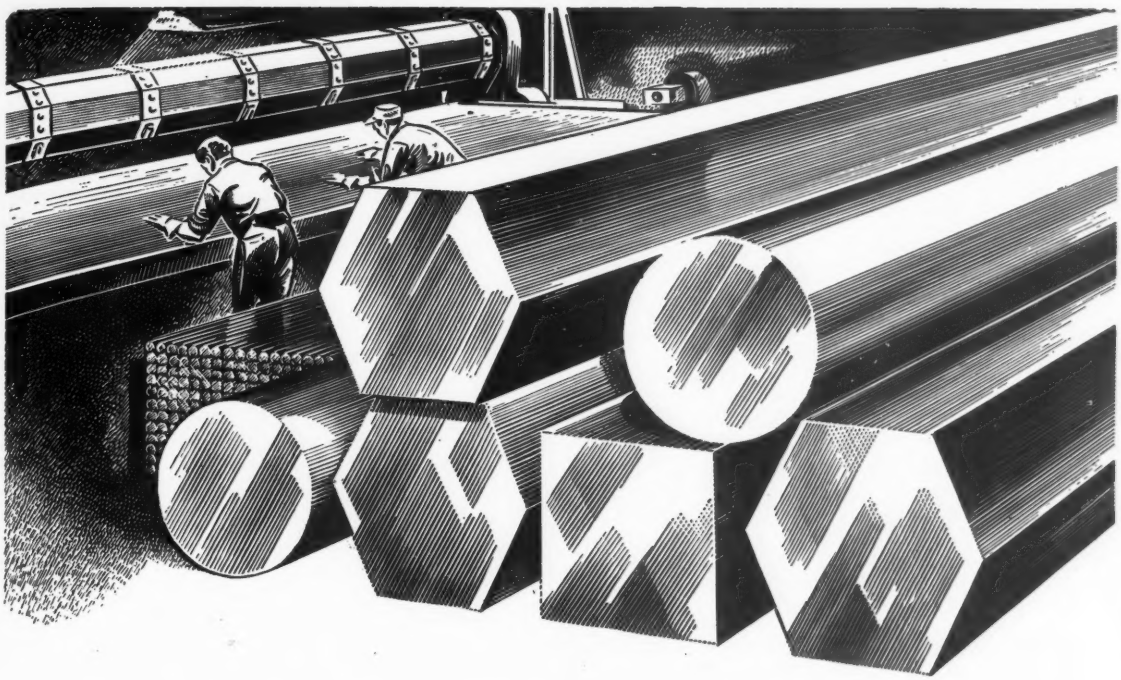


# Large-size Scovill brass rod for defense is more readily available

That's because Scovill's capacity to produce large-size rod was greatly expanded to meet huge rod demand of World War II . . . for screw machine products (specify Scovill *high speed*, free-cutting brass rod) and for forged or hot-pressed parts (specify Scovill *free-flowing* forging alloys).

The metal producing and fabricating industries have been placed again under Government controls...brass continues scarce, due to record-high demands coming at the same time that raw materials (copper, zinc, etc.) remain relatively short.

**But if you use brass screw machine or forging rod in round sizes 1″ to 3½″ in diameter, hexagonal sizes 1″ to 3⅜″ or square sizes 1″ to 2½″, Scovill can fill your orders more readily than for rod in smaller sizes.**

It's vital to get *full utilization* of every precious bit of brass rod you buy. And you do with Scovill rod . . . made by the unique *Continuous-Casting* process that assures unsurpassed *soundness* and *uniformity* of composition. This process, combined with Scovill's quality-controlled Rod Mill operations, makes possible uniformity of temper and gauge throughout your entire order. You save labor...uniformity means there's no tool re-setting necessary once your run is under way. You save brass . . . uniformity means accuracy, no waste. Surfaces are always clean and smooth . . . and Scovill packaging is outstanding.

For all these reasons, when you do get Scovill brass, you'll find "You Can't Buy Better Brass."

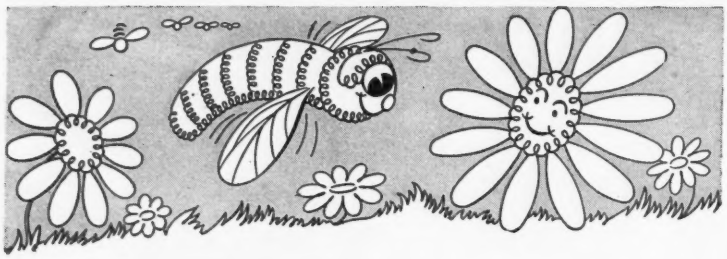
## "You can't buy better brass"

SCOVILL

A PRODUCT OF SCOVILL

*For complete information, contact:* **SCOVILL MANUFACTURING COMPANY,** 83 MILL ST., WATERBURY 20, CONN.

**BRASS MILL PRODUCTS IN A COMPREHENSIVE RANGE OF COMMERCIAL ALLOYS, SHAPES, TEMPERS AND SIZES**



A very good solution to your spring problem. See the man with a

**Versatile Torrington Spring Coiler**

In spring coiling, the words "Torrington" and "Versatile" are synonymous! When you desire springs produced to meet exacting requirements, just call the professional springmaker who has a Torrington coiler. He's the man who can fill your needs with accuracy, speed and economy. On special springs, our sales department will gladly assist you in finding a source of supply, or help your springmaker devise just the right tooling to produce it.

**MODEL W-11 SPRING COILER**
The 14 different Torrington Spring Coilers cover a range of wire diameters from .003" to .750".

**SPECIFICATIONS**
**of the Model W-11 Spring Coiler**

Wire diameter range: .015" to .072"

Wire Length per Spring: 0" to 42" (Extra Wire Feed Gears Available)

Coil Range (O.D.): 3/32" to 1-9/16"

Production: 23 to 190 springs per minute with variable speed drive.

Torsion and other attachments are available.

The TORRINGTON MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT


# LETTERS
## TO THE EDITORS

### Unwarranted Blast Furnace?

You state the French group, headed by Delattre et Frouard, will have the Colombian steel mill project ready to produce by the end of 1953 at the rate of 100,000 tons a year (STEEL, Mar. 26, p. 25). This figure seems too small, since you say they also will build a blast furnace,—and a capacity per year of 100,000 tons should not warrant construction of a blast furnace.

E. C. Dexheimer, engineering consultant
St. Louis, Mo.

• *The figure, 100,000 tons, is correct according to STEEL's French correspondent. We agree, such capacity does seem low to require a blast furnace—which may be the reason U. S. consulting engineers called the project uneconomical.*

### Pint Sized Welder

Where can we get additional information on the bench top welder described in STEEL, Apr. 16, p. 71?

G. V. Brunner
Radio Tube Division
Sylvania Electric Products Inc.
Emporium, Pa.

• *Write to Unitec Corp., 697 North Lake Ave., Pasadena 6, Calif.*

### Authorizing Overtime

STEEL's Apr. 9 cover story on renegotiation states overtime compensation for direct or indirect labor is among those costs that probably will get approval. We have reviewed the regulations and can find no authority for the statement, unless the overtime specifically is authorized by the contracting party.

Louis Handwerger
Rau Fastener Co.
Providence, R. I.

• *You are correct in saying there is no specific regulation governing overtime. There probably will be none—but industry men who recently have dealt with the renegotiators say overtime has been allowed as a cost even when not expressly stated in the contract, where it was proved to be necessary to getting the job done on time.*

### Significant Figures By ECE

The article, "Europe's Steel Capacity Increases," (STEEL, Mar. 26, p. 55) includes significant figures on current and future steel capacity abroad. What was the source for this data?

Jean P. Wesner
Bethlehem Steel Co.
Bethlehem, Pa.

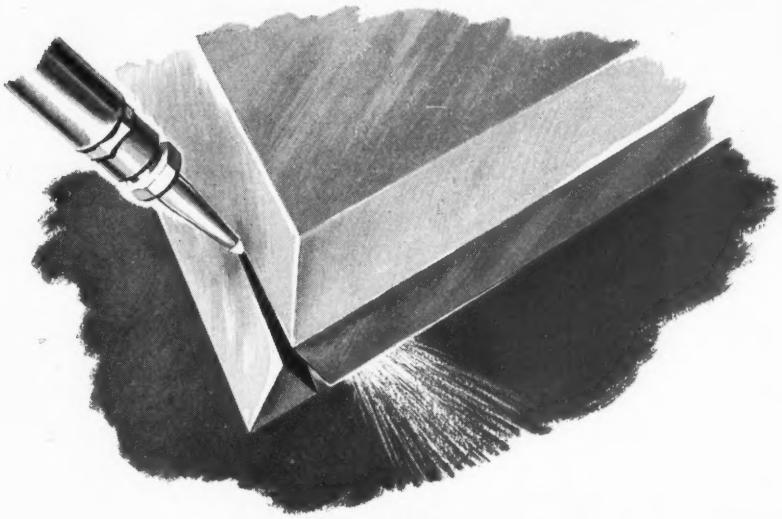
• *STEEL's source was the United Nations Economic Commission for Europe.*

### Interpretation Appreciated

Many thanks for your letter containing NPA Aluminum Order M-7 as amended Apr. 6, 1951, and your interpretation of the government's policy on manufacture of kitchen equipment (STEEL, Apr. 23, p. 12). This was exactly the information sought. My compliments to STEEL as the best in its field.

Charles McCrory
Shaker Heights, O.

# *Now!* Truly accurate plate-edge preparation to ± 1/16" tolerance *with a flame!*



It's true! Acetogen Fabricators are doing the job that industry thought couldn't be done. They're cutting all thicknesses of armor plate—square edge, bevel edge, multi-bevel edge—so smoothly and accurately that plates fit the welding jig without grinding or finishing.

Right now, the Acetogen Process is speeding vital defense work in the Philadelphia plant of Henry Disston & Son, Inc. Disston men are as amazed at the tremendous output of Acetogen Fabricators, as they are enthusiastic over the precision of their work.

The Acetogen Process will increase production for you, too. We have the organization and flame-cutting "know-how" together with the gas and nozzles; we will act either as consultants, or as sub-contractors—doing the entire job in your plant. *We invite your inquiry.* Acetogen Fabricators, Inc., 522 Commercial Trust Bldg., Phila. 2, Pa.

**ONLY THE ACETOGEN PROCESS OFFERS THESE STARTLING ADVANTAGES**

- Armor plate of all thicknesses flame-cut to ± 1/16" tolerance!
- The flame-cut plates are ready for welding without grinding, finishing, bridging, or beading!
- Single- and multi-bevels are as easy to flame-cut as square-edges!
- Flame-cut plates have "feather" edges . . . surfaces have sufficiently low Brinell to allow machining.
- No heavy investment needed; the Acetogen Process utilizes standard, readily-available, low-cost equipment and tools.
- Experienced flame-cutters become qualified Acetogen operators within a few days.

**ACETOGEN FABRICATORS, INC.** *Originators of precision flame-cutting*

your products are of highest quality

# with Pittsburgh Steel Wire

In all industry Pittsburgh Wire has proved again and again that it has the inherent quality to give top performance in any operation — forming, cold heading or spring making. The close metallurigcal control of every step in the manufacturing process from the blast furnace through the open hearth, rolling mills and wire mills gives you wire that is tailor-made for your particular practice. Since the ultimate quality of your finished products depends upon quality of the wire you use — be sure, specify Pittsburgh Wire. For information write Pittsburgh Steel Company, Department S, Grant Building, Pittsburgh 30, Pa.

The Steel Industry Needs Scrap— *Keep it Moving*

## Pittsburgh Wire

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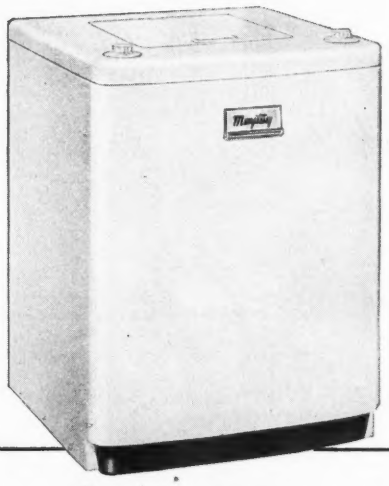
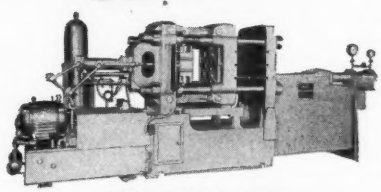
**Pittsburgh Steel Company**

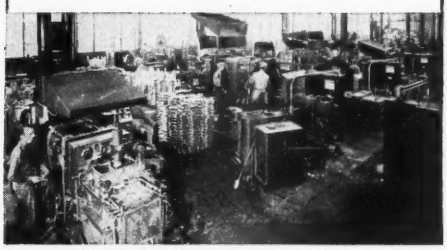
# KUX

## FIRST NAME IN DIE CASTING MACHINES





MODEL HP-35 ILLUSTRATED
Hydraulically operated die casting machine for production of aluminum castings.



Battery of KUX Die Casting Machines in operation in the ultra-modern Maytag factory at Newton, Iowa

**—helps make**

*Maytag*

**first name in washers**

**Since 1907,** over 6 million Maytag Washers have been sold—far more than any other. The reason's clear; Maytag makes a wonderful washing machine . . . plus a full line of other home laundry equipment and famous Dutch Oven Ranges. It's logical that KUX, first name in die casting machines, should be used in the quality production of these superior products.

The use of KUX die casting equipment can put YOUR PRODUCT ahead—or *keep* it ahead. Reduce your manufacturing costs—increase the saleability of your product, with quality die castings made on these rugged machines.

***Write for illustrated catalog showing complete line of KUX Die Casting Machines***

**KUX MACHINE COMPANY**
**3932 W. Harrison Street, Chicago 24**

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## FIRST NAME IN DIE CASTING MACHINES
## SELECTED BY FIRST NAMES IN INDUSTRY

# No Chatter!

## ...and no rough holes...when you use MORSE REAMERS with Staggered Flutes

If you want a hole sized accurately, *then you want Morse Reamers.* For the staggered spacing of the flutes ends all chance of "biting and slipping"... gives you completely new ideas about smooth cutting and accurate hole-sizing. And no monkey business!

One of the stars in the Morse Reamer line is the famed Morse Expanding Chucking Reamer ... which can be reground and reground, each time it finally wears below size. Cutting head is super-high-speed steel, butt-welded to a Straight or Morse Taper Shank. *By this design, tool life is multiplied many times.* And if you want *even longer* tool life, ask for "Morse Electrolized."

But Morse makes *all types of reamers.* And if you want Morse Quality ... both in tools and results ... then you've *got* to buy Morse Reamers. Your Morse-Franchised Distributor is the sole purveyor of Morse Quality in your territory. *Call him now!*

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**NEW BEDFORD, MASS.**
***(Div. of VAN NORMAN CO.)***
***Warehouses in New York, Chicago, Detroit, San Francisco***

# MORSE

## Cutting Tools

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## *PLATEMANSHIP*

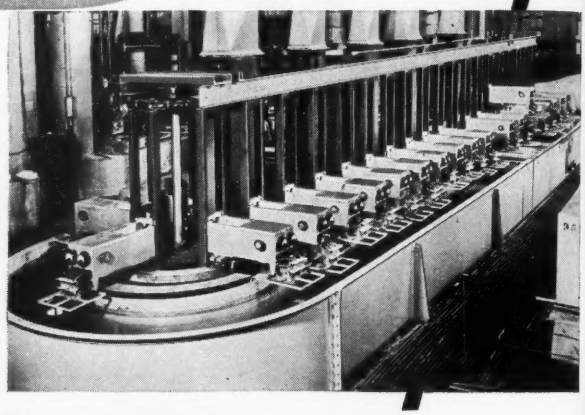
**H-VW-M's unique combination of:**

. . . the most modern and complete laboratory for testing and development

. . . ability to provide complete equipment and materials for every plating and polishing need

. . . the complete background of knowledge and experience in every aspect of plating and polishing.

**H-VW-M elevator-type full-automatic conveyor built during World War II to precision-plate bearings. Basically designed to provide independent control for each rack load.**



**Only H-VW-M PLATEMANSHIP can provide all THESE PLUS VALUES**

## *in elevator type full-automatic conveyors*

**. . . They're specifically designed to meet unusual and exacting conditions**

**. . . They have high lifts and deep tanks for low-ceiling plating rooms; function equally well with low lifts and shallow tanks**

**. . . They have a wide range of carrier spacing**

**. . . They have rigid carrier arms to which rigid fixtures may be attached**

**. . . They are adaptable to a wide range of weight and current loads, from aluminum parts to heavy steel sections**

**. . . They have versatility—individual treatments can be cut in and out or timing varied to suit requirements**

**. . . They have simplified means of ventilation**

Today's precision plating is the direct result of the stricter demands created by World War II when ordnance parts were plated inside and outside with various thicknesses of deposits. H-VW-M made major contributions to this development . . . drew upon *Platemanship* to engineer and build conveyors able to meet the most stringent and exacting requirements.

Precision plating is again vital to defense . . . and H-VW-M is again ready to draw upon a tremendous backlog of knowledge and experience to provide conveyors precisely right for the task at hand. If you are seeking contracts for plating, pickling, cleaning or anodizing, why not look to H-VW-M . . . and *Platemanship* . . . to secure the right equipment for the job?

*Write for Bulletin FA-103 for complete information of H-VW-M Full-Automatic conveyors.*

**HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, NEW JERSEY**

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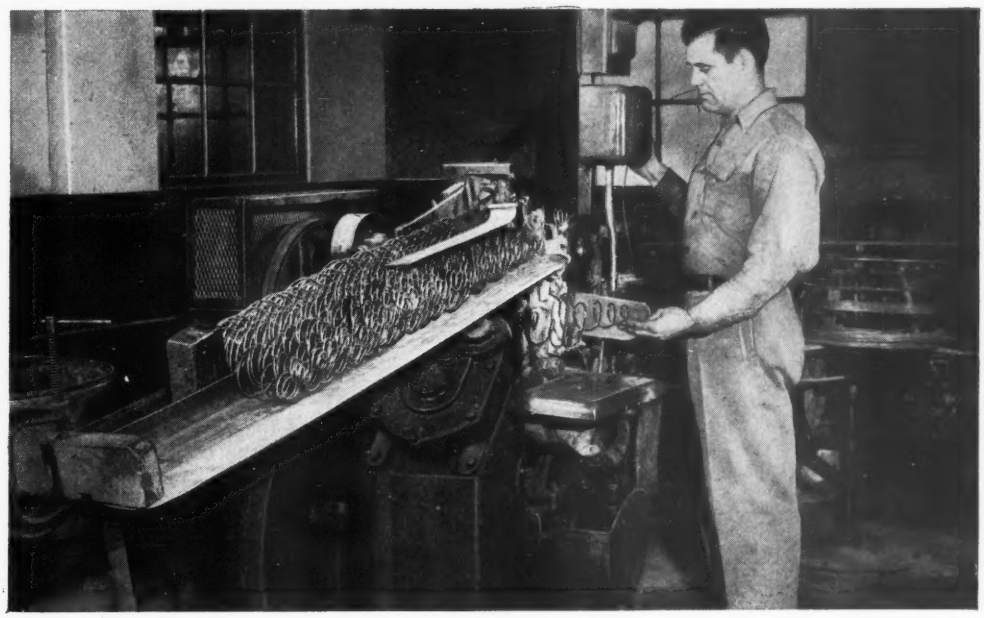
## *Roebling is one of America's largest manufacturers of specialty wire*

ROEBLING MAKES a full range of Spring Wires to meet almost countless purposes. There's upholsterers' spring wire. There's a wide variety of mechanical spring wires, including hard drawn, soft, annealed or oil-tempered M.B., H.B., and Extra H.B. spring wire; music wire, and valve spring wire . . . available in a large range of physical properties and finishes.

And on top of that, from open hearth to finished wire, all manufacturing processes are carried out in Roebling's own plants where positive control assures highest uniform quality at all times. From end to end, Roebling Spring Wire is identical in gauge and finish, in mechanical and metallurgical properties . . . saves preparation time for users . . . brings faster, smoother production.

Large quantities of Roebling specialty wire are required in today's rearmament program. You can count on us, however, to make every effort to meet your delivery requirements, always. John A. Roebling's Sons Company, Trenton 2, New Jersey.



# ROEBLING

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# Bright chapter in the West's growth

A NEW MILL to produce tinplate—critically needed by western can manufacturers—is now under construction by Kaiser Steel.

Scheduled for completion next year, it will add 200,000 tons of tinplate to the West's annual supply—enough for 2 billion cans a year.

This tinplate mill will help greatly to meet the urgent needs of the West's multi-million dollar produce industry. It will provide sorely needed metal to protect military provisions.

This is another chapter in a *continuous* story of expansion by Kaiser Steel . . . resulting in greater production of finished steels listed below. Today, this steel is helping in countless ways to supply military and essential civilian requirements.

More evidence that the West Coast's only integrated, *independent* steel plant is helping to build a stronger West . . . and a stronger nation!

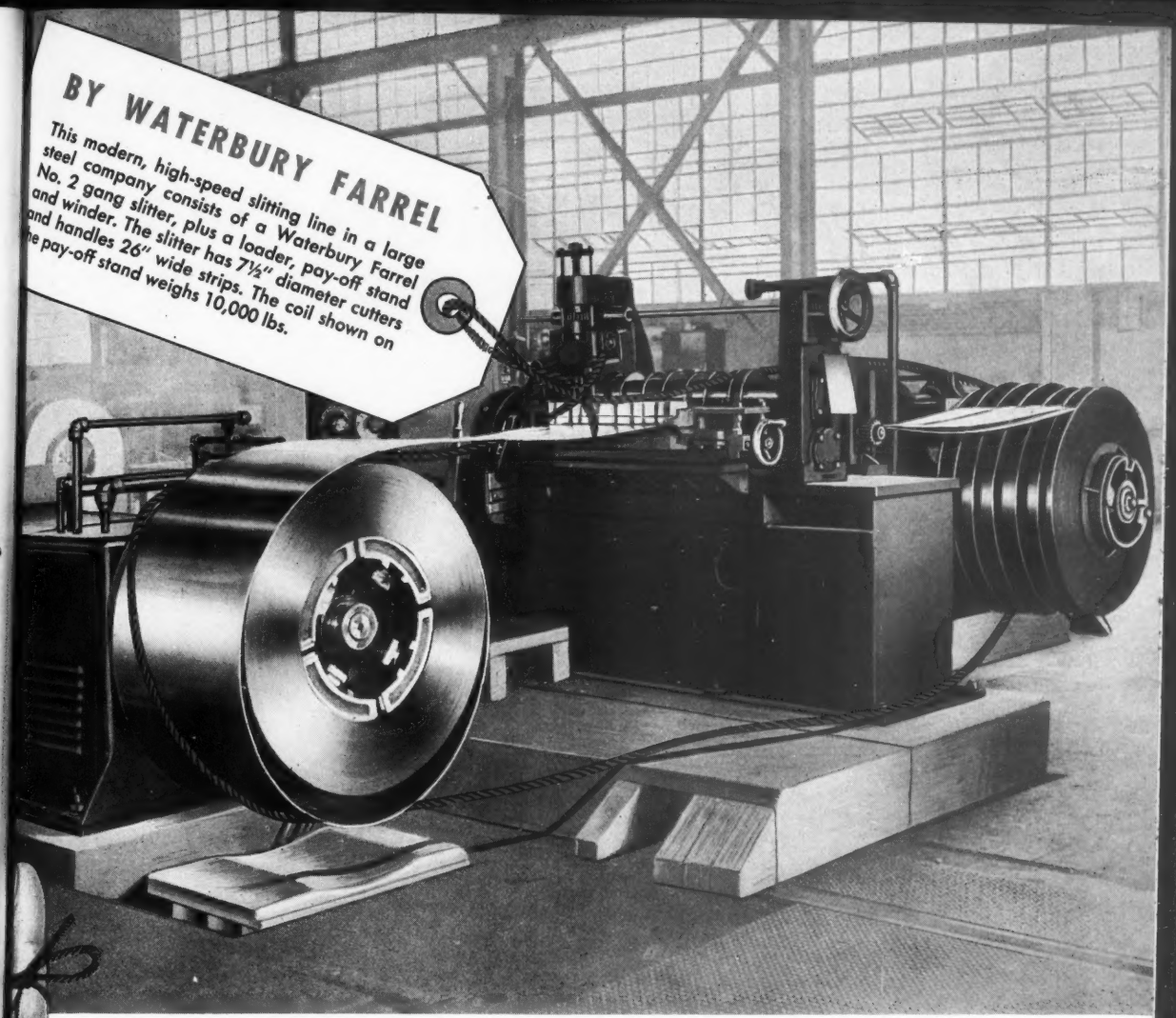
***It's good business to do business with***

# Kaiser Steel

***built to serve the West***

**PROMPT, DEPENDABLE DELIVERY AT COMPETITIVE PRICES** • plates • continuous weld pipe • electric weld pipe • hot rolled strip • hot rolled sheet • alloy bars • carbon bars • structural shapes • cold rolled strip • cold rolled sheet • special bar sections • semi-finished steels • pig iron • coke oven by-products

For details and specifications, write: **KAISER STEEL CORPORATION, LOS ANGELES, OAKLAND, SEATTLE, PORTLAND, HOUSTON, TULSA, NEW YORK**



## BY WATERBURY FARREL

This modern, high-speed slitting line in a large steel company consists of a Waterbury Farrel No. 2 gang slitter, plus a loader, pay-off stand and winder. The slitter has 7½" diameter cutters and handles 26" wide strips. The coil shown on the pay-off stand weighs 10,000 lbs.

*nember this:*

# WHEN YOU NEED A MODERN ANSWER TO SPECIFIC SLITTING REQUIREMENTS

Many manufacturers are finding that slitting their own strip pays in time and dollars.

From Waterbury Farrel you can get modern, high-speed slitting machines fitted by type, size and accessory equipment to your specific requirements.

There are six standard sizes of Waterbury Farrel gang slitters capable of handling a wide range of gauges and widths. Accessory equipment such as loaders, pay-off stands, winders, coilers, backrolls, scrap cutters etc., are available to make the entire slitting set-up a Waterbury-Farrel "package".

Special attachments can be "engineered-in" when necessary to adapt the slitters to special applications.

*Phone, write or wire for complete information.*

**WATERBURY FARREL FOUNDRY & MACHINE COMPANY**

**WATERBURY, CONNECTICUT, U. S. A. • *Sales Offices:* Chicago, Cleveland and Newark**

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A FEW OF THE MANY TYPES OF METAL WORKING MACHINERY MADE BY WATERBURY FARREL

PROCESS BOLT AND NUT MACHINERY — Headers (all types) • Re-headers • Trimmers • Thread Rolling nes • Slotters • Nut Tappers, etc. POWER PRESSES — Crank • Cam and Toggle; also Rack and Pinion Presses er Presses • Multiple Plunger Presses including Horizontal Drawing Presses and Eyelet Machines; Hydraulic s, etc. MILL MACHINERY — Rolling Mills • Wire Flattening Mills, Chain Draw Benches • also Slitters htteners • Pointers • Swagers • Cut-off Saws • Coilers • Winders and related equipment. WIRE MILL MENT — Continuous Fine Wire Drawing Machines • including Upright Cone and Tandem Wire Drawing Machines • Bull Blocks • String-up Machines • Spoolers, etc.

FOUNDED WATERBURY FARREL 1851

*In Equipment, Experience Coun*
*We're 100 in '51!*

*Wherever You are...*

# UNION CHAIN IS NEAR BY

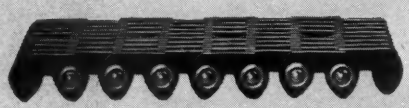
**Suppose you need UNION Machine Finished Steel Roller Chain...**

... and are certain of the pitch, length and sprockets required. Just write or phone your nearest Union Chain Stock Carrying Distributor listed on the facing page. He will make every effort to ship your requirements promptly.

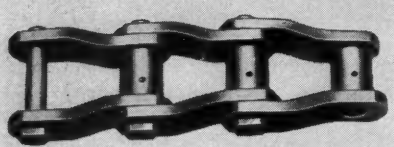
***...or suppose you need*** engineering assistance in the selection of a drive or a recommendation for a conveyor application. Talk or write to Union Chain's nearest district office as listed at the top of the facing page. You will receive unprejudiced, competent help.

***Unprejudiced*** because Union Chain makes all types of steel sprocket chains and is interested in providing each customer with the correct chain for satisfactory service at minimum cost.

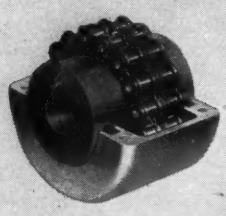
***Competent*** because Union Chain representatives are qualified through experience to make sound chain recommendations whether the application calls for roller chain, silent chain or one of the various heavy drive or conveying chains. We suggest it might profit you to discuss your chain problems with us.



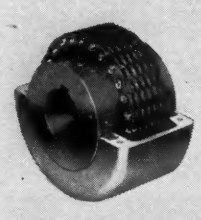
UNION SILENT CHAIN



UNION HEAVY DRIVE AND CONVEYING CHAINS



UNION ROLLER CHAIN FLEXIBLE COUPLINGS



UNION SILENT CHAIN FLEXIBLE COUPLINGS

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20 North University Street
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Standard Industrial Supply Co.
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Macon Supply Co.
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John D. Robinson Co.
13 Bay Street, West
Savannah, Georgia
J. M. Tull Metal & Supply Co.
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**ILLINOIS**
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923 S. Washington St.
Peoria 2, Illinois

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**MARYLAND**
Hagerstown Equipment Co.
Maryland Ave. & Memorial Blvd.
Hagerstown, Md.
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**MASSACHUSETTS**
Bellamy-Robie, Inc.
45 Main St.
Cambridge, Mass.
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**MICHIGAN**
Abrasive Supply Co.
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Wausau, Wisconsin
Richard E. Ela Co.
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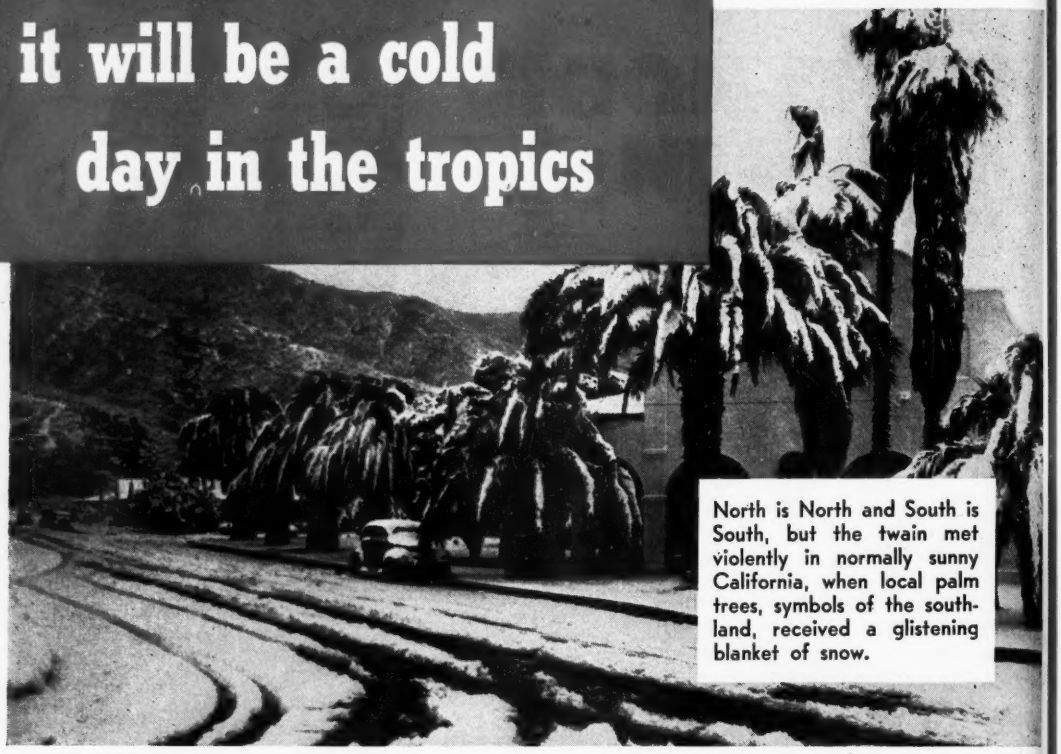
Madison, Wisconsin

**The Union Chain and Manufacturing Company** — **Sandusky, Ohio, U.S.A.**

TRANSMIT POWER
UNION CHAINS
CONVEY MATERIALS

# it will be a cold day in the tropics



North is North and South is South, but the twain met violently in normally sunny California, when local palm trees, symbols of the southland, received a glistening blanket of snow.

—when we succeed in pleasing everybody all the time. But that doesn't keep us from trying. We believe in the old-fashioned principle of being friendly and helpful whether we are in a "buyers" or a "sellers" market.

**FERRO-SILICON 25 - 50 - 65 - 75 - 85 - 90%**
**SPECIAL BLOCKING 50% FERRO-SILICON**
**LOW CARBON FERRO-CHROME SILICON**
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**BRIQUETS**

**SILICON • MANGANESE • CHROME**
**SILICO - MANGANESE**

PHILO — DEPENDABILITY · QUALITY · SERVICE — RAINIER

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*Ohio Ferro-Alloys Corporation*
*Canton, Ohio*

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SAN FRANCISCO AREA—Pacific Graphite Company, Inc., Oakland 8, California.

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NORTHWEST AREA—E. A. Wilcox Company, Arctic Building, Seattle 4, Washington; Phone Mutual 1468.

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# Is this clue to quality on your product?

*Can you find the clue . . .*

*. . . to quality?*
*✕ marks the spot . . .*



*Yes! a* **PHILLIPS SCREW**

Phillips Cross-Recessed Head Screws are found on everything from washing machines to postage meters.

They are your assurance of a well-built, quality product, providing creep-free tightness at all fastening points.

**THIS ADVERTISEMENT is part of the current campaign aimed at the 14 million readers of The SATURDAY EVENING POST.**

BY USING PHILLIPS SCREWS on your product, you prove *on sight* that you use extra care in manufacture. The public knows that X marks the spot — the identifying X formed by the cross-recess on the head of every Phillips Screw. It is the mark of extra quality.

These screws — wood, machine or tapping — add structural strength, set up tighter, resist the loosening effect of vibration. They are speedier—and cost saving because they save time, work, money. They start faster, eliminate driver skids, damaged parts, split screw heads. They make good workers out of green help — fast!

Be sure to include Phillips Cross-Recessed-Head Screws in your specifications.

## PHILLIPS *Cross-Recessed-Head* SCREWS

✕ *marks the spot . . . the mark of extra quality*

AMERICAN SCREW CO. • THE BLAKE & JOHNSON CO. • CAMCAR SCREW & MFG. CORP.
CENTRAL SCREW CO. • CONTINENTAL SCREW CO. • ELCO TOOL & SCREW CORP.
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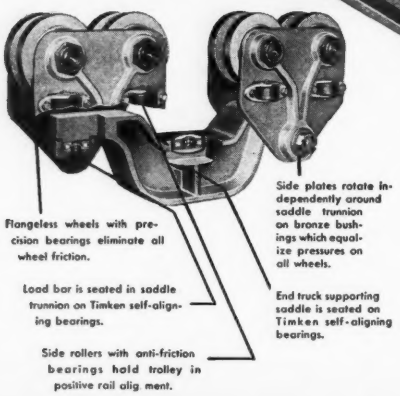
SHAKEPROOF INC. • THE SOUTHINGTON HDWE. MFG. CO. • WALES-BEECH CORP.

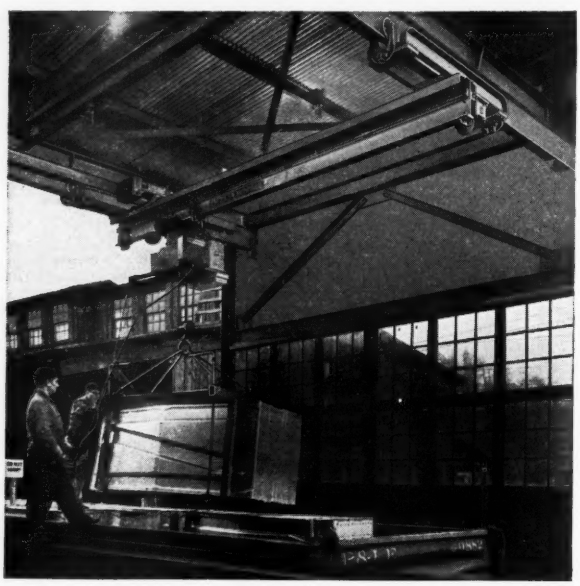
THE FASTENERS OF TODAY . . . AND OF THE FUTURE

# AMERICAN MONORAIL CRANES

*for*

**constant service**


Flangeless wheels with precision bearings eliminate all wheel friction.
Load bar is seated in saddle trunnion on Timken self-aligning bearings.
Side rollers with anti-friction bearings hold trolley in positive rail alig ment.
Side plates rotate independently around saddle trunnion on bronze bushings which equalize pressures on all wheels.
End truck supporting saddle is seated on Timken self-aligning bearings.



Only two men are needed to transfer bundles from shipping rooms directly into gondola cars—a saving of 32 man-hours per shift over previous method. This crane is in constant service. The secret of its success is Articulated Trolleys.

When each trolley wheel carries its share of the load in perfect alignment with the craneway tracks and all possible friction is eliminated, the result is perfectly articulated trolley travel.

Applied to American MonoRail Cranes, these articulated trolleys permit constant operation—handling loads up to 10 tons. And with this is offered all the flexibility of MonoRail design for interlocking carrier service between and beyond the craneways.

Let an American MonoRail engineer explain all the advantages of these new cranes, or write for complete information.

**THE AMERICAN MONORAIL COMPANY**

**13102 ATHENS AVENUE** **CLEVELAND 7, OHIO**

*This 85" hollow-section ring is produced by The French Oil Mill Machinery Company, Piqua, Ohio. It weighs 6500 lbs. and meets tensile strength requirements of 40,000 lbs.*

# FOR HOLLOW-SECTION CASTINGS...

## CHATEAUGAY TOPS THEM ALL!

Consider, for example, this giant ring—a component of the desolventizer toaster used in processing soya beans into cattle feed. Hollow passages between the ¾" thick dual wall sections form a pressurized steam chamber. Because of this, each finished casting must undergo a 300 psi water pressure test before passing code inspection.

Here are the reasons why CHATEAUGAY, Republic's *exclusive* premium pig iron, is used in this application:

1. **CHATEAUGAY is an exceptionally fluid iron . . . cools evenly . . . fills adjoining light and heavy sections completely.**
2. **CHATEAUGAY shrinks evenly throughout every casting . . . produces an unusually fine and uniform grain structure.**
3. **CHATEAUGAY castings machine readily.**

Whether or not you use CHATEAUGAY Pig Iron, a Republic Pig Iron Metallurgist will be glad to help you get top production from your present facilities. Just let us know when you would like to see him.

**REPUBLIC STEEL CORPORATION**
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

**Republic PIG IRON**

| "CHATEAUGAY" | "REPUBLIC" | "PIONEER" |
|---|---|---|
| Low-Phosphorus, Copper-Free | (Northern) Foundry, Basic and Malleable | (Southern) Foundry and Basic |

REPUBLIC STEEL

**IDLE SCRAP** slows steel production. Comb your plant today for old machinery . . . then call your scrap dealer.

These are the special purpose steels that set Crucible apart from most other steel companies. For these special steels must be so carefully compounded, and so sensitively handled that, in most cases, they cannot be mass produced.

Such steels include those designed for use under severe conditions of heat or cold, stress, strain, or wear. For example: Crucible high-speed tool steels are in the whirring machines that cut and shape the toughest metals; Crucible hollow drill steels work around-the-clock digging mines and quarries, and Crucible stainless steels put a sparkle with a purpose in our kitchens.

If you have an application that calls for a special steel, Crucible's metallurgical staff stands ready to help you. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

**CRUCIBLE** first name in special purpose steels

51 years of Fine steelmaking

Spaulding Works, Harrison, N. J. • Midland Works, Midland, Pa. • Park Works, Pittsburgh, Pa. • Spring Works, Pittsburgh, Pa.
National Drawn Works, East Liverpool, Ohio • Sanderson-Halcomb Works, Syracuse, N. Y. • Trent Tube Company, East Troy, Wisconsin

You saw this ad in the Saturday Evening Post, Time, Newsweek, Business Week

# especially tool steels!

Crucible Tool Steels have been pampered pets every day of the 51 years Crucible has led in this highly specialized field. That's why tool steel users, assured of getting what they want from Crucible, have kept us the country's number one tool steel producer.

Since Industry is constantly opening new fields that require new tool steels, Crucible's interest in their further development and improvement goes on unabated. You can profit from the wealth of knowledge gained by Crucible in the application of these steels to thousands of uses. The unparalleled experience of our metallurgists is freely available to you.

That's why it pays to get *all* your tool steel requirements from Crucible.

*write for your selector today*

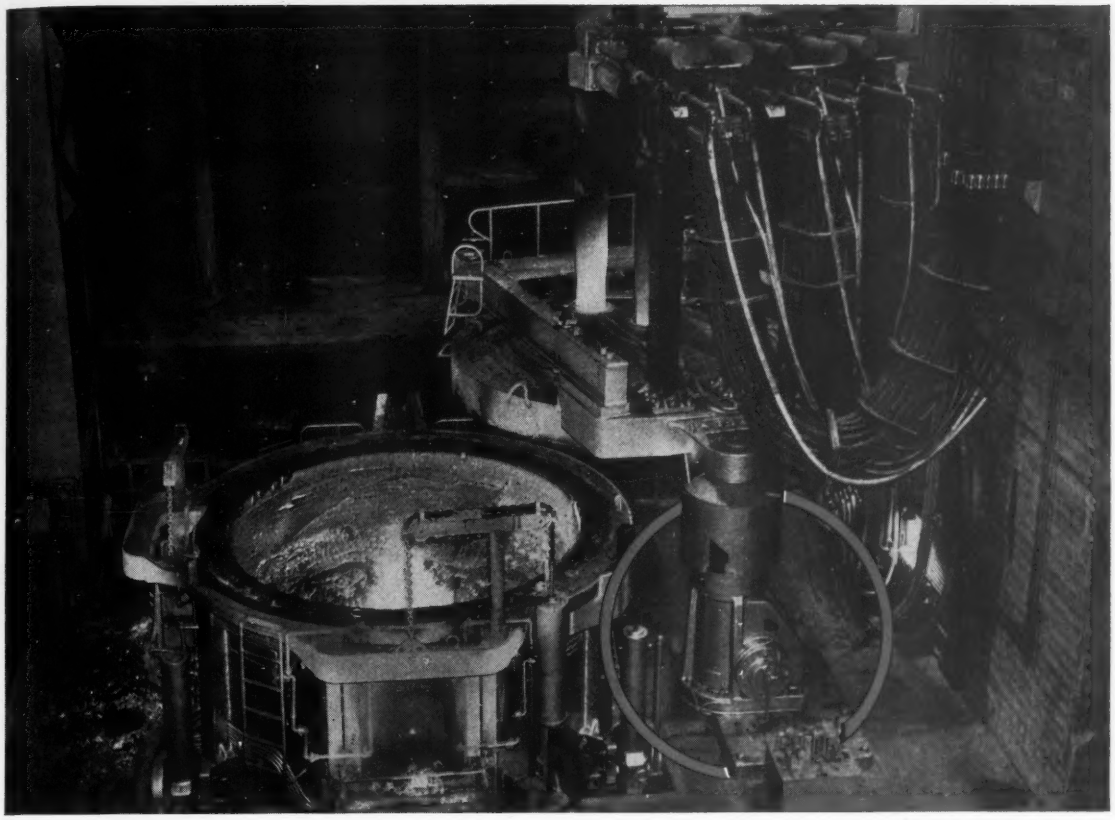
If you haven't gotten your handy tool for selecting tool steels, write: Dept. S, Crucible Steel Company of America, 405 Lexington Avenue, New York 17, New York

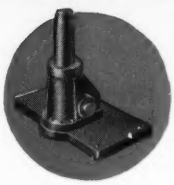
3 colors, 9" diameter

**CRUCIBLE** first name in special purpose steels

51 years of Fine steelmaking **TOOL STEELS**

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE • ROCKFORD SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.





# *Its swinging roof has its feet firmly planted on the ground*

You swing a lot of weight—and fast—when you open a Lectromelt Furnace for charging. But that weight is carried on a foundation completely independent of the furnace itself, so the support is rigid and there's no strain on the shell.

Because every ounce of the sturdy top structure of a Moore Rapid Lectromelt Furnace rides on massive oil bearings, it swings aside easily and smoothly. No chatter to shake roof bricks loose.

This combination helps make Lectromelt electric arc furnaces the best choice for melting, refining, smelting and reduction. For more details on these furnaces, write for Catalog No. 8. Pittsburgh Lectromelt Furnace Corporation, 323 32nd Street, Pittsburgh 30, Pennsylvania.

**Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . SWEDEN: Birlec, Elektkougnar A/B, Stockholm . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Raubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Brossoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.**

**WHEN YOU MELT...**

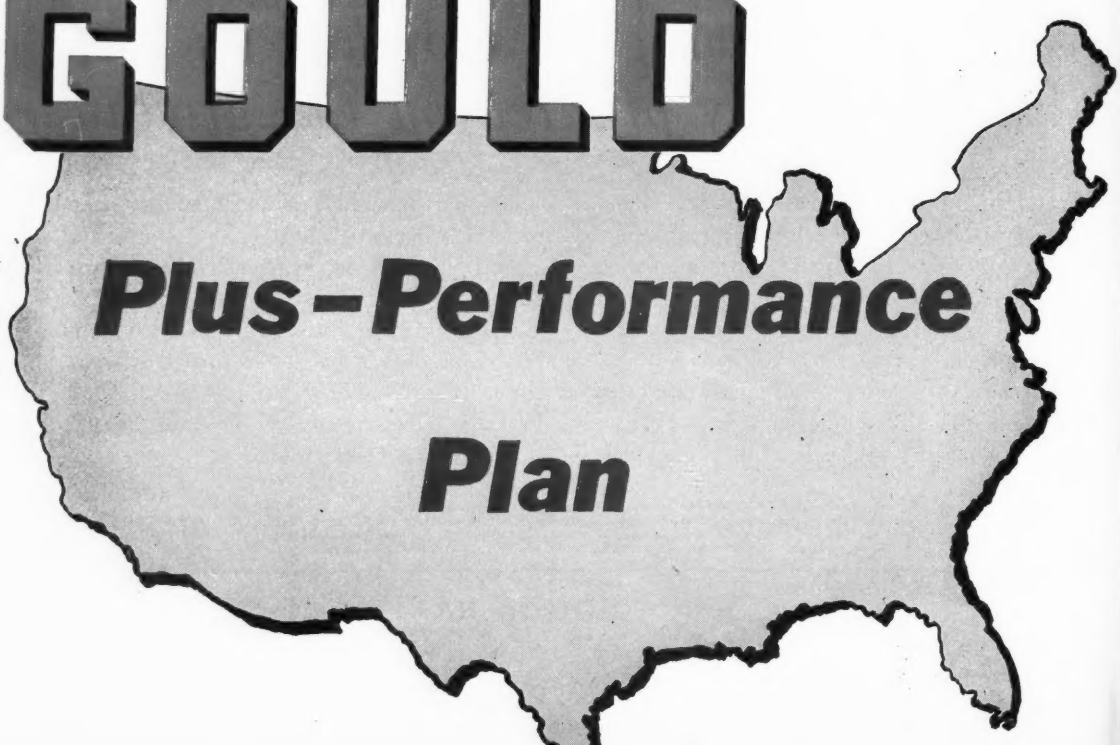
**MOORE RAPID**

***Lectromelt***

# Here's Help

**You demand more and more from your batteries as industry strains its facilities for defense. To help you get more out of these essential tools of production—to choose, use, handle and maintain your batteries without waste— Gould announces the**

# GOULD



# You Need NOW!

**Battery performance can be improved as much as 50%* if these eight points are put into practice:**

1. **Buy Your Batteries to Fit the Job.** Purchase of oversized or undersized batteries wastes money, materials and manpower.
2. **Install Your Batteries Correctly.** Connect them properly, ventilate adequately and handle according to printed instructions.
3. **Use Your Batteries Within Designed Capacities.** Overdischarge cuts down battery performance.
4. **Charge Your Batteries Properly.** Use recommended rates of initial, finish and float charges.
5. **Maintain Your Batteries Systematically.** Organize a preventive maintenance program.
6. **Inspect Batteries Periodically.** Tighten loose connections and replace worn cables.
7. **Test Your Batteries Regularly.** Keep a record of cell readings—know the condition of your batteries at all times.
8. **Replace When Necessary.** When you know the condition of your batteries, you can place your orders far enough ahead to insure continuous service.

**GOULD'S PLUS-PERFORMANCE PLAN is designed to help you conserve and extend your essential battery power. It is a complete, integrated system of manuals, articles, specifications, bulletins, record cards and charts which give you information on every one of these eight points—explaining and illustrating how to choose, use, install, charge, maintain, inspect and test.**

**From tests in the Gould Research Laboratory and performance tests in the field.*

## *LET THIS PLAN GO TO WORK FOR YOU...WRITE US TODAY!*

Any or all of the material available under the Gould PLUS-PERFORMANCE PLAN is FREE to battery users without obligation. A request on your letterhead stating the particular problem or problems in which you are interested, will bring the appropriate literature—and booklet explaining the complete plan—by return mail. Write us, attention Field Engineering Department.

**GOULD**

**STORAGE BATTERIES**

**GOULD-NATIONAL BATTERIES, INC.,** TRENTON 7, NEW JERSEY

*Always Use Gould-National Automobile and Truck Batteries*

# WHY ABBOTTS DAIRIES CHOSE A REFRACTORY FORTIFIED WITH ALCOA ALUMINA

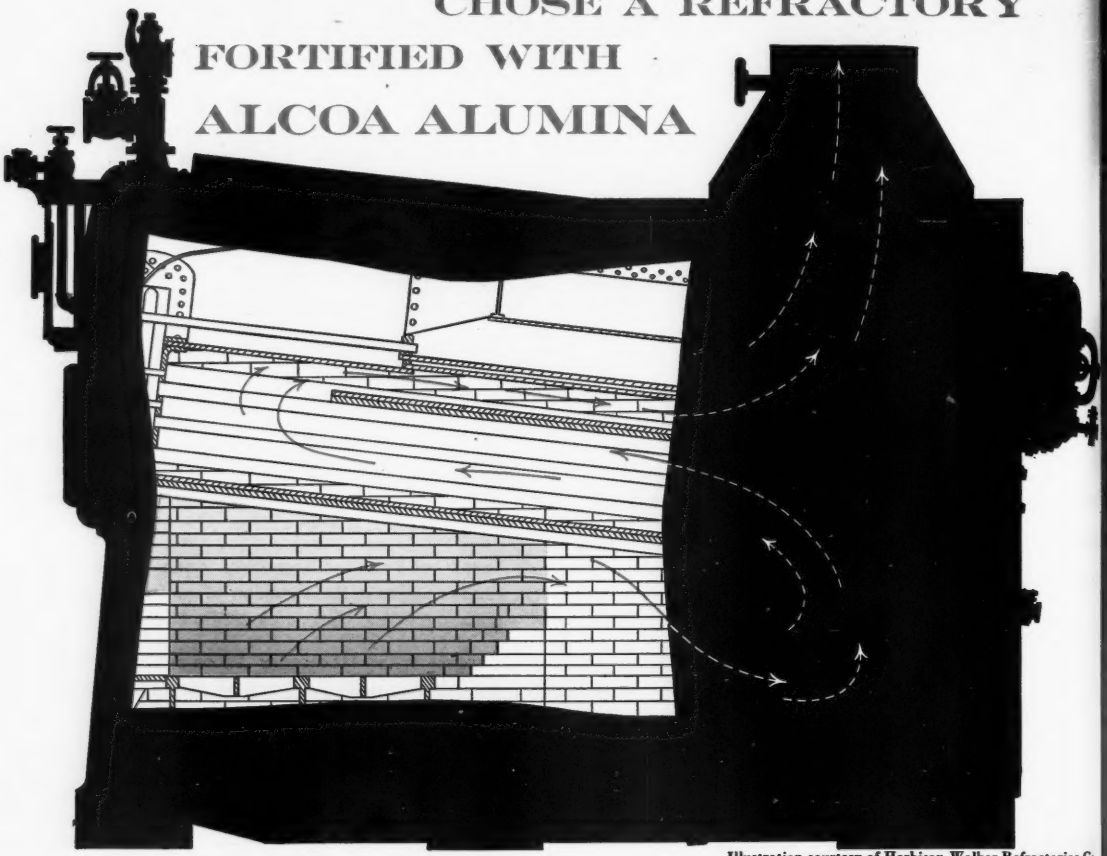


Illustration courtesy of Harbison-Walker Refractories Co.

*Horizontal type boiler at Cameron creamery uses Korundal 90% ALCOA Alumina-content brick to resist extreme slagging by high iron oxide coal ash at unusually high temperatures. Korundal is used to a height of 30" above grates in side wall and for complete 9" facings of bridge and front walls.*

REFRACTORY BRICK must prove itself the hard way at Abbotts Dairies, Bruce and Cameron, Wisconsin.

Six months of the year, round-the-clock, white-hot flames and molten slag torture boiler furnace walls in an extremely severe test for the best refractories available.

In 1944, Korundal, a 90% ALCOA Alumina-content brick, was installed experimentally in one of the Bruce creamery boilers. After a convincing demonstration of several years, high alumina-content Korundal was installed in Abbotts Cameron creamery boiler furnace, because down-time and repairs cost more than good refractories.

Refractory brick made with ALCOA Alumina offers *you* these money-saving advantages:

- **Strength and stability under load at high temperatures.**
- **Resistance to spalling, abrasion and fluxing at high temperatures.**
- **Resistance to corrosive slags and fumes.**
- **Low porosity.**
- **Negligible shrinkage.**

You can buy refractory brick and other shapes, containing various percentages of ALCOA Alumina to meet your requirements, from leading manufacturers. We'll gladly refer you to dependable sources of supply. Write to: ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 622E Gulf Building, Pittsburgh 19, Pa.

*Alcoa Chemicals*

ALCOA ALUMINUM

**ALUMINAS and FLUORIDES**

ACTIVATED ALUMINAS • CALCINED ALUMINAS • HYDRATED ALUMINAS • TABULAR ALUMINAS • LOW SODA ALUMINAS ALUMINUM FLUORIDE • SODIUM FLUORIDE • SODIUM ACID FLUORIDE • FLUOBORIC ACID • CRYOLITE • GALLIUM

# UNITED

*6 stand continuous horizontal and vertical Billet Mill*

*Golden Anniversary 1901-1951*

**UNITED ENGINEERING AND FOUNDRY COMPANY**
*Pittsburgh, Pennsylvania*

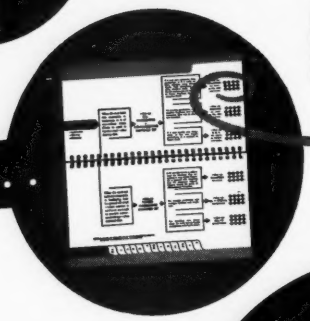
PLANTS AT PITTSBURGH • VANDERGRIFT • NEW CASTLE
YOUNGSTOWN • CANTON

*SUBSIDIARIES:* ADAMSON UNITED COMPANY, AKRON, OHIO
LOBDELL UNITED COMPANY, WILMINGTON, DELAWARE
STEDMAN FOUNDRY AND MACHINE CO., INC., AURORA, INDIANA

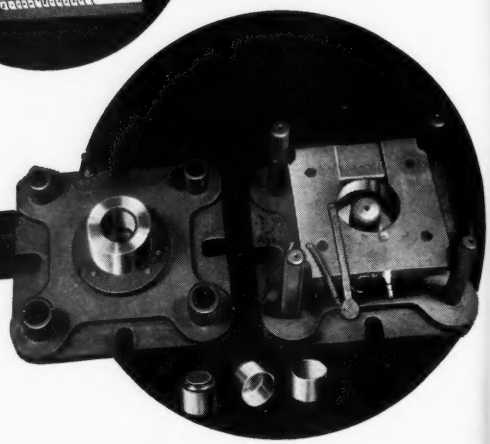
*Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.*

# How ONE TOOLMAKER . . .

# USED THIS GUIDE . . . . . —then use HAMPDEN (Oil-Wear) or No. 610 (Air-Wear)



# TO HOLD DOWN UNIT COSTS . . .



AT which step in your tooling process would you welcome real help in reducing tool and die costs? Tool Steel Selection? Heat Treating?—or on-the-job "Trouble-Shooting"? Here's how you, like the maker of the Dies shown here, can start to reduce costs with a Method that helps you at *all 3* steps.

First, to simplify selection, use the handy Selector Section in the Carpenter Matched Tool Steel Manual. Quickly and surely, it enables you to put your finger on the proper steel for best results. Next, to further insure tool and die performance, use the Manual's complete heat treating instructions—they have been simplified beyond anything previously known. It's easy to get started—use the Carpenter Matched Set Method to help you "trouble-shoot" your present tool and die jobs.

For better, lower-cost tooling, put this practical, easy-to-use Method to work, now. Ask for the 189-page Carpenter Matched Tool Steel Manual—just see your Carpenter representative. The Carpenter Steel Company, 139 W. Bern Street, Reading, Pa.

***Job:***
Compound Blank and Draw Die for forming .031", ¼-hard brass Vent Valve Bodies at the rate of 103 per minute on a punch press.

***Problem:***
Unit costs were on the upswing because the old dies wore too rapidly, causing frequent and costly machine shutdowns for regrinding.

***Solution:***
Looking for a die steel with maximum wear resistance, the toolmaker referred to the Selector Section in the Carpenter Matched Tool Steel Manual, and quickly arrived at Carpenter *Hampden* (Oil-Wear).

***Heat Treatment:***
Simplified instructions in the Manual were followed.

***Results:***
2 hours of costly machine downtime were eliminated *each day*—production per grind *rose over 300%!* As a matter of interest, the toolmaker takes off approximately .0005" per stoning and gets about 100 grinds from the Blank and Draw Die.

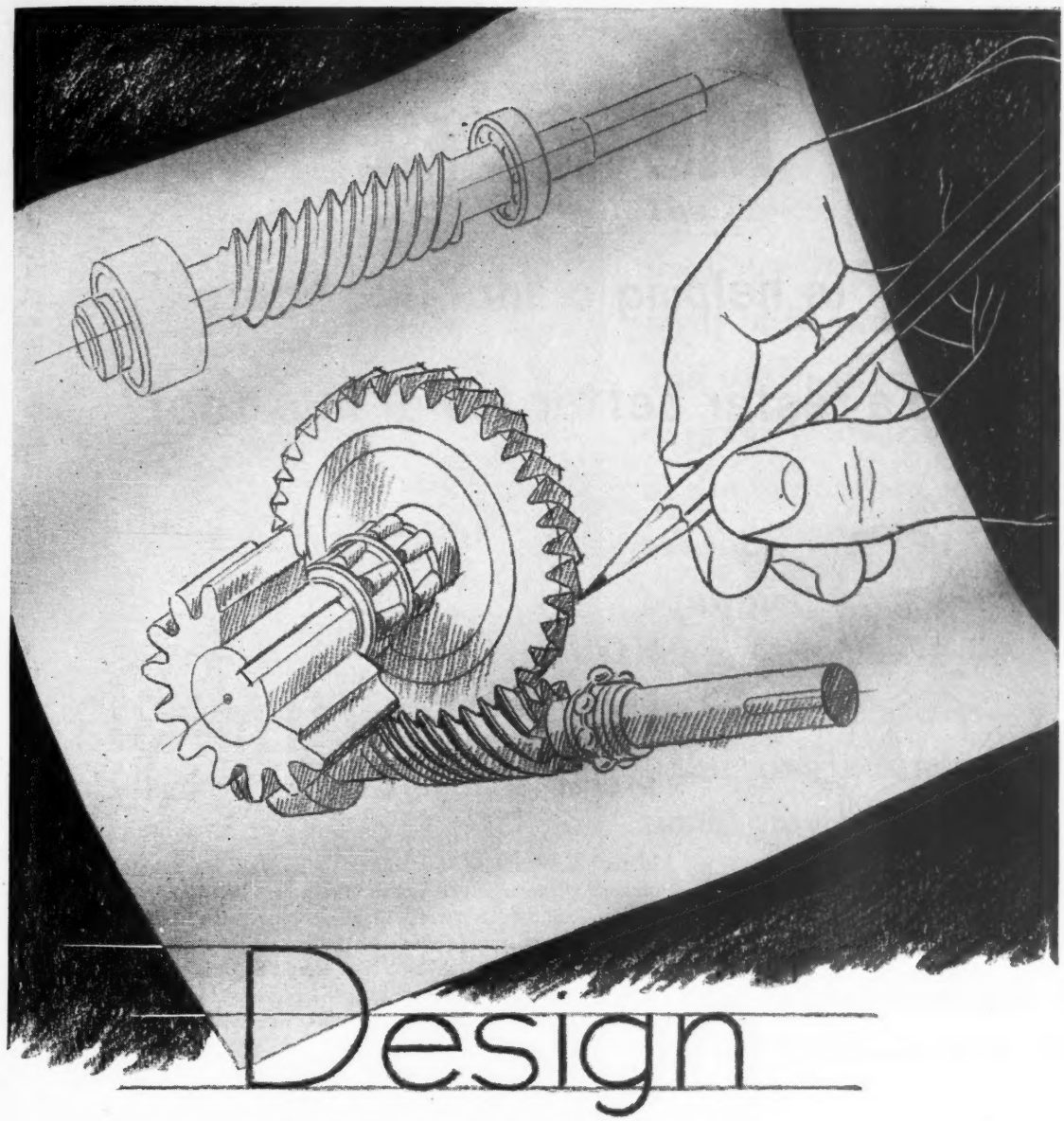
**DON'T WAIT... COOPERATE!**
*The U.S. Needs Your Steel Scrap, Now*

Export Department: The Carpenter Steel Co., Reading, Pa.—"CARSTEELCO"

# Carpenter
## MATCHED TOOL & DIE STEELS

**More than top-grade steels . . . a Method to keep tooling and production on schedule!**

*For your convenience, Carpenter carries warehouse stocks in principal cities throughout the country*

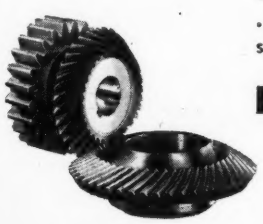


# Design

Planning how torque may be applied through gears is a service which, at BRAD FOOTE, we call design. Here . . . in our own plant . . . we have engineers with long experience designing better, more efficient gear assemblies.

• These men well know BRAD FOOTE's creed—"*No one shares our responsibility.*"

• They know the gears they design—for use in your shop or on the equipment you sell to others—will bear a proud brand name—BRAD FOOTE. So, our designers start your order on its journey through our plant . . . and through a system of complete control which assures satisfactory performance of the gears you buy.



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**Cicero 50, Illinois**

# NEW METAL CLEANER

## is helping plants like yours

## do a faster, better job at low cost!

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# HOUGHTO-CLEAN 313-A

***prepares steel for finishing as it cleans***

In tests and in use, this quick-acting acid phosphate cleaner is proving its effectiveness in metal and maintenance cleaning. It removes soil, oils, compounds and other coatings speedily and economically. Even without its other advantages Houghto-Clean 313-A would be outstanding. One of these extra advantages is the increased adhesion it provides for paint, lacquer and other finishes. The light, tough phosphate film it leaves on metals also resists corrosion if the finish is scratched or broken. And it keeps corrosion from spreading in case this coating is accidentally scraped off. Corrosion is halted wherever the metal is covered by the Houghto-Clean 313-A film!

You'll find this acid phosphate cleaner is easy to apply. It needs no special tanks or equipment. Try a drum of Houghto-Clean 313-A and notice how it helps you save on paint, too. Or write for further information to E. F. Houghton & Co., Philadelphia 33, Pa.

**OTHER OUTSTANDING HOUGHTON CLEANERS INCLUDE:**

**Houghto-Clean 220**
— an emulsion type product widely used as a general purpose production line cleaner in still tanks or power washers.

**Cerfak Liquid**
— synthetic detergent ideal for cleaning heat treated work; up to 10 times faster than ordinary cleaners.

**Alkaline Cleaners**
— a series of Houghton-developed cleaners for specific light, medium and heavy duty work.

**HOUGHTO-CLEAN 313-A**
**. . . a product of**

**E. F. HOUGHTON & CO.**
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO

***Ready to give you on-the-job service . . .***

# CECO-DROP

**The rapid striking action of the Ceco-Drop, the quick get-away of its ram after striking and the hammer's low center of gravity, insuring accuracy of die match, are some of the reasons why forge shops equipped with Ceco-Drops show increased production, more uniform accuracy and lower costs than with conventional gravity drop hammers.**

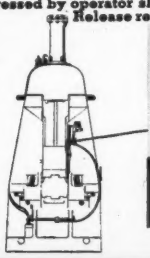
*Write for Bulletin 30-L-0*

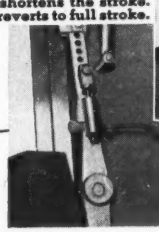
**CHAMBERSBURG ENGINEERING CO.**

**CHAMBERSBURG, PENNA.**

***NEW!*** **CECO-DROP SHORT STROKE CONTROL**

**May be applied to your present Ceco-Drop or furnished on request when ordering. Button on treadle when depressed by operator shortens the stroke. Release reverts to full stroke.**





(*Above*) Dog in full Stroke Position. Wedge is lifted. Short Stroke Control is inoperative.

(*Left*) Dog in Short Stroke Position. Wedge is down, holding dog in operating position.

*Everywhere You Look - it's*

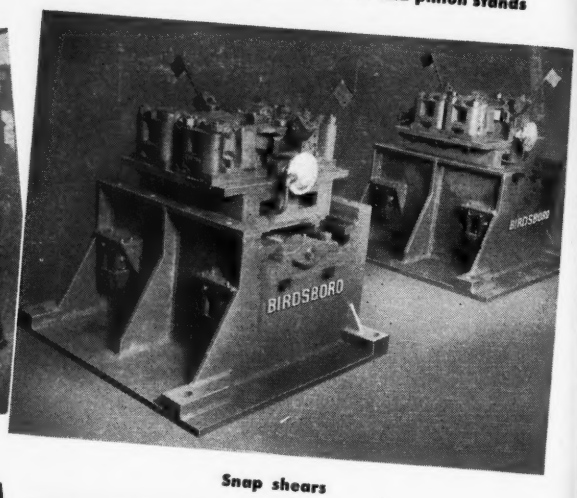
# BIRDSBORO

## STEEL MILL MACHINERY

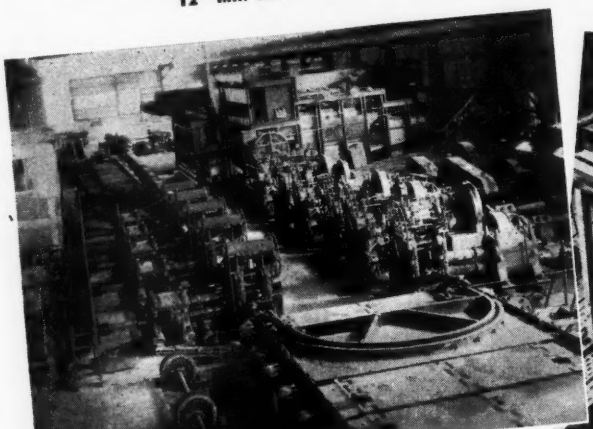
**From single pieces of equipment to complete mill installations**

18" tandem bar mill combination drive and pinion stands

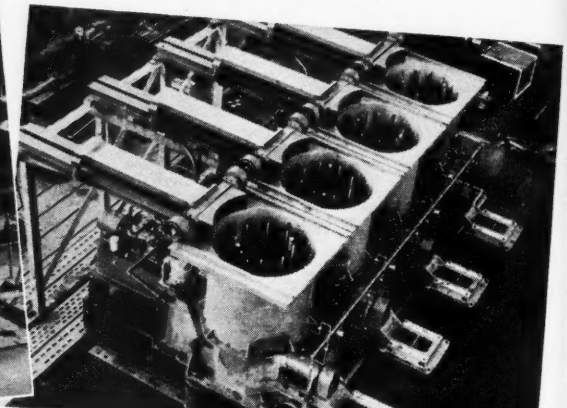
12" mill structural straightener




Snap shears



10" semi-continuous strip mill



10" rod mill coilers

# BIRDSBORO

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Birdsboro, Penna.

**STEEL MILL MACHINERY**

Designers and Builders of:

Steel Mill Machinery • Crushing Machinery • Rolls
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*Offices in:*
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MM-15-51

# Is this Your Work?

- ☐ Laboratory Melting
- ☐ Precision Casting
- ☐ Melting Gold, Silver, Platinum, other precious metals
- ☐ Melting Non-Ferrous Alloys up to 60 lbs.
- ☐ Melting Ferrous Alloys up to 30 lbs.

## Get Closer Control with this *FASTER* Ajax-Northrup 20-KW. Furnace

If your melting calls for a hard-boiled combination of melting speed, superfine control, and overall economy, this Ajax-Northrup 20 kw. converter-operated induction furnace can do the job. Melts 30 lbs. of brass in 20 minutes. 17 lbs. of steel in 35 minutes. No carbon contamination—no oxidation. Precise control of composition and temperatures . . . even with alloys that are "impossible" to handle in other furnaces.

Self-tuning. No adjustments required while melting. No moving parts to wear out. Maintenance is limited to annual inspection of two electrodes. Flexible . . . easy, quick changeover from one alloy to another. Built also in 3, 6, and 40 kw. sizes. Generator operated units to 1200 kw. and 8 tons. Send today for free bulletins covering any melting or heating problem.

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HEATING & MELTING.

123

Built-In Balance Improves Toolroom Grinding When You Use...
Uniform structure assures identical cutting action throughout each wheel and from wheel to wheel . . . prevents vibration . . . allows closer tolerances, smoother finishes.
Precision, lightweight bushing maintains the new inherent balance . . . is more firmly anchored in the wheel . . . gives precision arbor fit.
Made of various Norton abrasives for fast, cool cutting of expensive high-speed steel and cast alloy tools without drawing their temper. Reduce tool spoilage.
YOUR NORTON DISTRIBUTOR NOW HAS THEM in sizes and shapes up to 12" diameter for any toolroom grinding job.
ASK FOR THEM.
NORTON
12x1x1¼
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38A80-IV.
ALUNDUM
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32A60-J5VBE.
ALUNDUM
7/5x2x1¼
38A60-J8VBE.
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# NORTON *NEW-PROCESS* GRINDING WHEELS

***Truly uniform within each wheel and from wheel to wheel***

## NO OTHER WHEELS GIVE YOU ALL 3

**1. YOU GET CLOSER TOLERANCES** because the built-in balance of Norton *New-Process* Wheels reduces vibration . . . eliminates chatter marks . . . lasts for the life of each wheel.

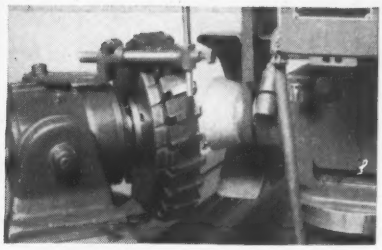
**2. YOU GET MORE UNIFORM GRINDING ACTION** because the more uniform structure of Norton *New-Process* Wheels causes more even wheel wear. You also have perfect confidence that all identically marked wheels *will perform identically.*

**3. YOU REDUCE TOOL SPOILAGE** because Norton *New-Process* Wheels, made with the *right* selection of fast, smooth-cutting Norton abrasives, allow heavier cuts in expensive, heat-sensitive, high-speed steel and cast alloy tools . . . without drawing their temper.

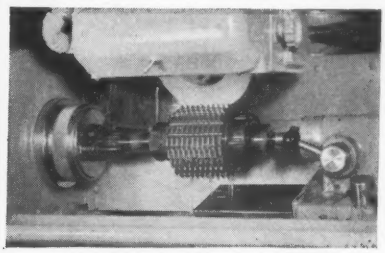
**COMPARE** Norton *New-Process* grinding wheels with any others in your toolroom . . . and watch production rise and costs drop. Your nearby Norton distributor or representative will help you select from the wide range of Norton tool and cutter wheels ones that will improve your toolroom grinding.

**NORTON COMPANY, WORCESTER 6, MASS.**
Warehouses in 5 cities. Distributors in all principal cities.

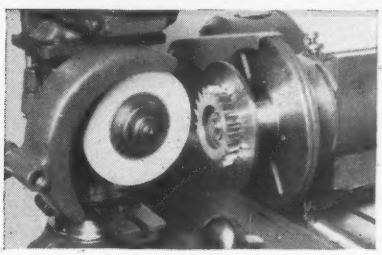
**NORTON**
**ABRASIVES**
*Making better products to make other products better*



**ALL TEETH ARE THE SAME HEIGHT** when you sharpen milling cutters with long-wearing free-cutting Norton *New-Process* Wheels . . . they hold size all the way around the cutter.



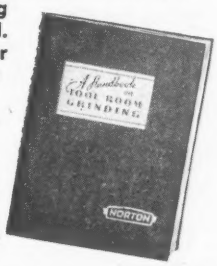
**CORNERS ARE HELD,** yet free cutting action maintained, when you sharpen gear cutting and splining hobs with Norton *New-Process* Alundum* Wheels.



**FLAT, CHATTER-FREE SURFACES** on tools and dies directly result from the built-in, work-hugging balance and dimensional accuracy of Norton *New-Process* Wheels.

**FREE 160-PAGE HANDBOOK FOR TOOLROOM OPERATORS**

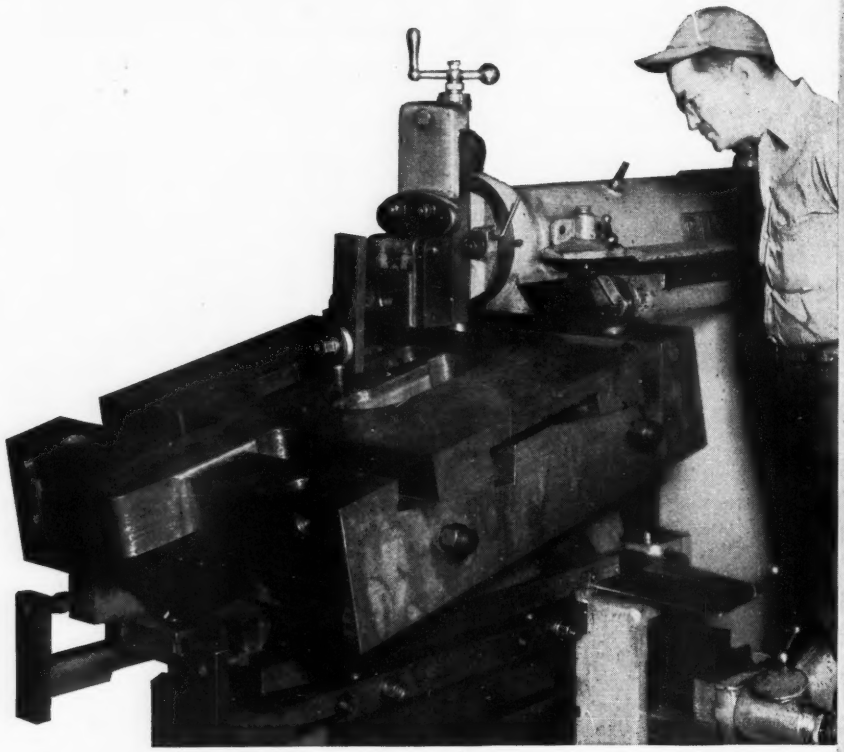
Here's the most comprehensive guide to top-production, bottom-cost toolroom grinding ever published. Every operator should have a copy of this Handbook on Toolroom Grinding. Write for your free copy of FORM 835-B8




*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

# Cincinnati Shapers are

# versatile money savers...

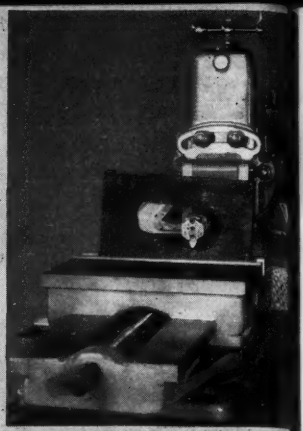


Eight to ten hours' work cut to fifteen minutes in this unusual application of a versatile Cincinnati Shaper.

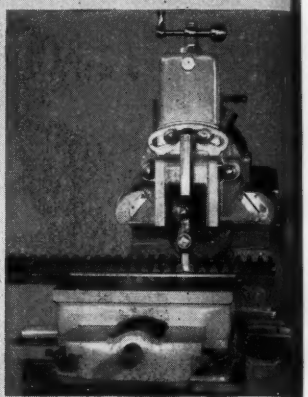
Hand scraping the mating surfaces of press bed bolsters required eight to ten hours. On this Cincinnati Shaper the lapping operation replacing the hand scraping method takes only fifteen minutes.

Versatile Cincinnati Shapers, with low tooling and set-up costs, bring to your shop a money-saving "handy man."

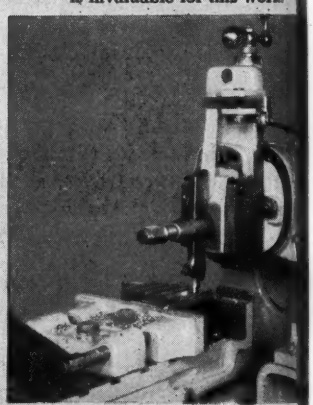
Write for Catalog N-5, illustrating the complete line of powerful, accurate and versatile Cincinnati Shapers. You will find just the size and type for your shop.



**1. Internal Shaping**
Many irregular shapes are with a simple extension tool.



**2. Maintenance and Repa**
The unusual versatility of a sh is invaluable for this work.



**3. Contouring**
A great variety of shapes automatically machined w tracer control.

**THE CINCINNATI SHAPER CO.**
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SHAPERS · SHEARS · BRAKES

# The Metalworking Outlook

## Draft Relief for Machinery Makers

Defense officials in Washington will try to "soften" the effects of selective service on key industries, particularly those making capital goods. There will be no set procedure and no official announcement, but NPA will try to relieve individual situations on a spot basis, by appeals to the Defense Department and occasionally by appeals to local draft boards. Capital goods makers are hardest hit by the labor shortage, both because of the high skill they require in their personnel and because they have a difficult time bidding for the available workers against other, larger defense industries.

## Critical Jobs: On Paper Only

Don't expect much draft relief from the list of critical occupations drawn up by the Labor Department. Draft boards need refer to that list for guidance only and the final decision is still up to them. What's more, the vast majority of men who qualify in the skilled occupations are above the draft age anyway. A revised list of critical occupations contains these metalworking skills: Aircraft and engine mechanics, blacksmiths and hammersmiths, boilermakers, chemists, die setters, oil drillers, airplane electricians, electronic technicians, all types of engineers, glass blowers, instrument repairmen, marine layout men, loftsmen, machinists, maintenance mechanics, miners, metal spinners, model makers, molders and coremakers, patternmakers, iron and steel rollers, sawsmiths, tool and die designers and makers.

## Auto Tools Assured for 1952

Auto makers won't get all the machine tools they've ordered for 1952 models, but they'll get most of them. The inclination of NPA is to permit tooling that's already well along. The agency has even agreed —reluctantly—to help get materials for those orders if machine tool builders can't get them and if the auto manufacturers can't find them.

## Deficit in Machine Tools

There's a decided deficit in machine tools for defense, says NPA. Washington has set a 1951 production goal of $800 million, more than double the 1950 output. To turn out such a volume, the industry needs more capacity—NPA thinks not in the form of new plants, but through more subcontract sources. The industry believes it must have relief from provisions in CPR 30, the machinery price order, to operate at top efficiency. Chances are good that the builders will win some modifications before the regulation goes into effect May 28.

## Politics and CMP

A good bet: A full Controlled Materials Plan without the open-end feature will eventually be necessary. The more they work with the open-end CMP, the more convinced become government officials that politics will wedge their way into that open end. Defense men see a pattern like this: A company will feel it's not getting a fair shake and will complain to its senator or representative. Many legislators will be tempted to use their weight to get special treatment for companies that complain the loudest, particularly since some free-market

*Production-Engineering News—p. 79* *The Market Outlook—p. 143*

tonnages of steel, aluminum and copper will still be available . . . CMP heads are considering putting a few phases of the plan into effect even before July 1.

### Fast Amortization Under Fire

Watch for a congressional move to limit tax amortization authority under any renewed defense production act. Legislators are uneasy about tax losses the five-year writeoff plan might permit and are listening to criticisms of the existing law from non-government economists (p. 51). Some influential Senate Banking Committee members are particularly anxious for tighter limitations. The RFC scandals have contributed greatly to the changing attitude.

### Troubles in Oil

Makers of pipe and oil country goods can expect more help in getting steel now that Iran's nationalization of its oil industry makes the world petroleum situation more precarious than ever. Significant is the Interior Department action permitting 41 oil operators more tubular goods for drilling activity in 20 foreign countries. Domestic drilling should get more encouragment, too. The industry wants to drill 73,000 new wells a year, but thus far Washington has been allocating steel on the basis of only 43,400 new well drillings annually. The industry says it needs 157,500 tons of pipe a month. Production lately has been at the rate of only about 130,000 tons.

### A Substitute Makes Good

Substitution of boron for molybdenum, a scarce metal, has proved so satisfactory that boron-treated steel is being used on an ever-increasing scale. The latest use is for driving mechanisms of locomotives, including gears, pinions and shafts. One effect of the Korean War will be to put boron permanently on the map.

### Straws in the Wind

U.S. Steel Corp. soon will place experimental plants in operation in Minnesota for the processing of taconite; they'll have an annual capacity to handle 2 million tons of taconite to produce 500,000 tons of beneficiated ore . . . Inflation has boosted Army costs 25 per cent in the past four months; the greatest increase is in the cost of ammunition, artillery, tanks and combat vehicles . . . The certificate of necessity granted New England Steel Development Corp. to write off the cost of its proposed $250 million plant in Connecticut has been extended to July 11, pending more negotiations with existing steel companies to operate and build the facility.

### Here and There in Industry

Defense Production Act amendments to condemn property, license business and set up production councils will be a blow to metalworking if they slip by Congress (p. 51) . . . Makers of special machinery, such as packaging equipment, have trouble getting into the defense program (p. 55) . . . The screw machine products industry expects to turn out at least $240 million worth of products in 1951 (p. 61) . . . European countries (not counting Russia) face an iron ore shortage of between 5 million and 10 million tons by 1953 (p. 63).

# METAL STAMPINGS

## SIMPLIFY

THIS CONVERTOR CLUTCH ROLLER CAGE

*for* Spicer

ORIGINALLY ASSEMBLED WITH 22 PIECES

PRODUCTION STEEL COMPANY

Detroit, Michigan

The Leake organization appreciates the close cooperation of steel men in making available sheets with metallurgical properties that enable us to accomplish *the unusual in metal stampings.*

## *NOW,* STAMPED IN ONE PIECE

In many instances the LEAKE organization has been able to simplify complicated assemblies with unusual metal stampings. The LEAKE staff, cooperating with customer engineers, have reduced component parts . . . made them stronger . . . with greater dimensional accuracy . . . lighter in weight, and in many cases savings in metal, time and unit costs.

The above example is typical of the *unusual* metal stampings that have been produced in our complete-service plant. Size, quantity, gauge and assembly are no problem. Press equipment includes batteries of small, medium and large high-speed inclinables to huge triple-action hydraulics. Supplementary services include Brazing and Annealing, Carburizing and Hardening, Cleaning, Testing, Prime Coating and all types of Welding.

These facilities coupled with imagination and good craftsmanship make a "complete-package" service that can be of real benefit to you. Leake engineers are ready to help you with your stamping problems.

**LEAKE STAMPED METAL PARTS AND ASSEMBLIES GIVE YOU:**

**Economy · Strength · Uniformity Light Weight · Dimensional Accuracy · Good Appearance . . . all with the satisfaction of Prompt Delivery**

THE LEAKE STAMPING COMPANY · MONROE, MICHIGAN

**LEAKE**

**EXPERTS IN PRESSED METAL**

COMPLETE PRESSROOM—MACHINE SHOP
HEAT TREAT—BRAZING—WELDING
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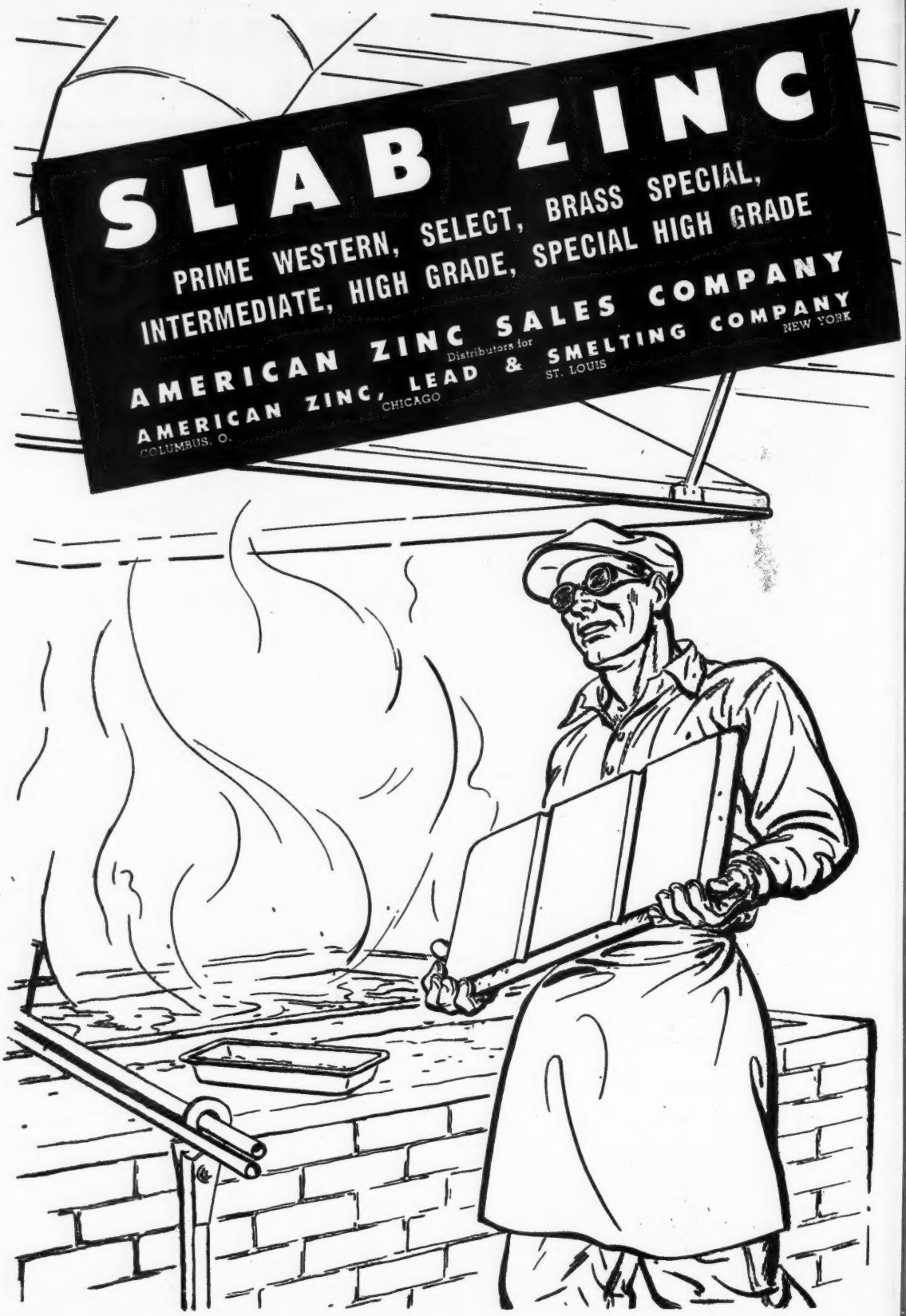
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# Dangerous Proposals

On Apr. 26 Senator Maybank and Representative Spence introduced identical bills which if enacted would extend the National Defense Production Act, which expires June 30 this year, to June 30, 1952, and would amend it drastically in some important particulars. The bills have been referred to the Senate and House Banking and Currency Committees.

The avowed purpose of most of the 28 amendments proposed in the bills is to strengthen price controls and to give the President more powers with which to deal with problems of defense. These were the explanations given by President Truman in requesting the legislation and by Senator Maybank and Representative Spence in introducing it. However, careful reading of the text shows that some of the amendments would go much further than is indicated by the remarks of these gentlemen. In fact, they would carry the nation far down the road toward socialism.

For instance, one of the amendments would alter the present law which permits the President to requisition real property for needs of national defense under certain conditions. The proposed changes would permit the President to take immediate possession upon the filing of a petition in any court without further hearings. Under this provision the government could take possession of a property even before the owner was aware that the government wanted it.

Another amendment would grant authority for the government to acquire privately owned plants through the above mentioned process of arbitrary condemnation and to "erect and construct plants, factories, and other industrial facilities for the purpose of manufacturing, producing and processing materials necessary to the national defense effort."

A third amendment would grant authority to impose federal licenses upon all business establishments, ostensibly to aid enforcement of price regulations. This would force every company subject to price control to obtain a license as a condition of doing business.

These three illustrations are sufficient to indicate how dangerous are the proposed amendments to the defense act. They would give the administration a free hand to take a long step toward socializing American industry. They would trample upon the rights of individuals. Congress should reject them overwhelmingly.

E. L. Shaner

EDITOR-IN-CHIEF

**IT ISN'T A SUBSIDY:** Conscious of anti-business sniping against "rapid depreciation" as a subsidy or other "gift" to industry, Irving S. Olds, chairman of United States Steel, gave a chamber of commerce audience some simple arithmetic to prove these charges are false.

He traced Joe Jones' depreciation and tax problems from purchase of machines to final ac-

counting. "It makes not the slightest difference whether the cost of the machine is written off in one year, three years, five years or any other number of years. At the end of the useful life of the machine, the result will always be exactly the same as long as the tax rate remains the same."

Rapid amortization neither subsidizes nor enriches business at public expense. It expands rather than diminishes tax revenues. It enables industry at its own expense to expand for defense production. —p. 51

* * *

**400% MORE UNITS:** Politicians and reformers who complain that the field of opportunity for "small business" is narrowing alarmingly should take a look at the screw machine products industry. It consists of more than 1500 companies. More than half of them have sales of less than $100,000 a year. Only 4 per cent employ more than 100 persons and about 25 per cent employ more than 20.

Competition is keen. Principal factors are price and quality. The latter may be the more important because the cost of screw machine products usually is small in relation to the total cost of the product in which they are components. The industry will sell $240 million of products this year. This is 356 per cent of 1939 sales, but individual companies will not enjoy this gain in volume because there has been a 400 per cent increase in the number of companies in the industry since 1939. —p. 61

* * *

**WE COULD BE BETTER:** In spite of the excellent reputation for efficient manufacturing enjoyed by many branches of the metalworking industry, somebody comes forth every once in a while with cold statistics which show there is plenty of room for improvement. E. G. Dudley of General Electric says that machines designed since World War II are on the average 40 per cent more productive than older equipment, that 95 per cent of the country's machine tools are at least 10 years old and that productivity of metalworking industries could be increased by at least 10 per cent by replacement of tools.

He believes improved materials handling equipment and methods might well cut handling costs 25 per cent and save 650,000 man-years of unnecessary labor annually. All in all, the manufacturing industries need $35 billion of new equipment to raise facilities to first class technical standards.

In short, we may think we're pretty good, but we could be much better. —p. 84

* * *

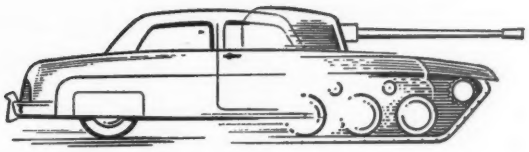
**SELF RELIANT IN JETS:** Ever since the end of World War II, American industry has been keenly conscious of the inherent danger of depending too much upon materials imported from far away places, supplies of which could easily be cut off in time of global war. Great efforts have been made to develop new sources less vulnerable to attack and to find substitutes.

As one outcome of these efforts, Pratt & Whitney Aircraft is producing J-48 Turbo-Wasp jet engines made entirely from materials available in the Western Hemisphere. Dependence on metal imports from Asia, Africa and Europe has been completely eliminated. Use of columbium, available only from Africa, has been avoided, and the use of tungsten and cobalt has been reduced to a small amount well within the capabilities of supply sources in North and South America. —p. 115

* * *

**GEOGRAPHICAL TRENDS:** In the April issue of "Dun's Review" Reinhold P. Wolff and Frederick H. Bair Jr. analyze the growth of 106 United States cities having populations over 100,000. In the decade from 1940 to 1950 the 20 fastest growing cities were Spokane, Berkeley, Long Beach, San Diego, Phoenix, El Paso, Corpus Christi, San Antonio, Houston, Austin, Ft. Worth, Dallas, Wichita, Baton Rouge, Memphis, Mobile, Montgomery, Miami, Charlotte and Norfolk. The 20 slowest growing cities were Somerville, Boston, Providence, New Bedford, Fall River, New Haven, Buffalo, Rochester, Utica, Paterson, Newark, Jersey City, Elizabeth, Trenton, Pittsburgh, Scranton, Reading, Wilmington, Youngstown and Chattanooga.

With the exception of Wichita all of the fastest growing cities are in the West and South. With the exception of Chattanooga and Youngstown, the slowest growing cities are in the Northeast. The North Central states have only one fastest growing city, Wichita, and only one slowest growing city, Youngstown. Metalworking companies can well afford to study these significant regional trends. They will gradually change the market pattern for many products.



# Safer Now to Buy Alloys on Hardenability

The defense program requires conservation of strategic metals—so, as in the last war, alloy steel analyses are changing. Some standard alloys are still available. But many new, or interim, analyses are already on the market. Others are on the way.

Today more than ever, under these changing conditions, the safest way to buy alloys is on the basis of analysis *and* hardenability rather than on analysis alone. When we know the hardness or tensile strength you need, we make absolutely sure that the alloy you receive meets your requirements—even though it will be many months before standard hardenability ranges of the new steels are established. Here is how we do it:

We carefully test each and every heat of as-rolled and annealed alloy steel in our stocks. This gives us actual knowledge of the hardenability of every bar of Ryerson alloy. Thus when you specify on a hardenability basis you can be sure the alloy you get from Ryerson will meet your requirements. And you can also be sure of getting the desired heat treatment results because the test information and other helpful data to guide you come with the steel.

Not every company makes these tests, records this information, but Ryerson does—and at no extra cost to you. It's all part of a service system called the Ryerson Certified Steel Plan. So during this confusing period, order by AISI and SAE number if you wish but also specify hardenability and be doubly sure. Though some shortages are inevitable, we will do our level best to supply the alloy steel you need.

**PRINCIPAL PRODUCTS**

**ALLOYS**—Hot rolled, cold finished, heat treated. Also tool steel
**CARBON STEEL BARS**—Hot rolled and cold finished
**STRUCTURALS**—Channels, angles, beams, etc.
**PLATES**—Many types including Inland 4-Way Safety Plate
**SHEETS**—Hot and cold rolled, many types and coatings
**TUBING**—Seamless and welded, mechanical and boiler tubes
**STAINLESS**—Allegheny bars, plates, sheets, tubes, etc.
**BABBITT**—Five grades, also Ryertex plastic bearings
**MACHINERY & TOOLS**—For metal fabrication

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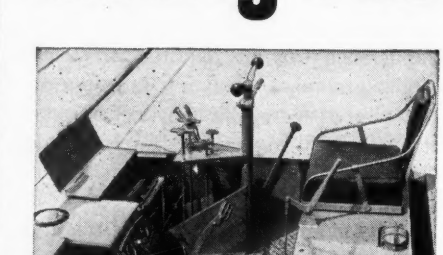


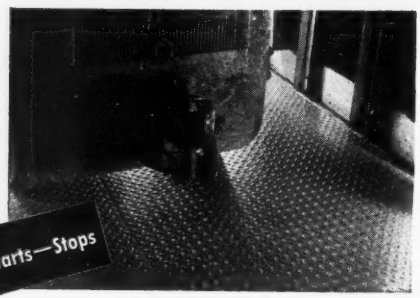


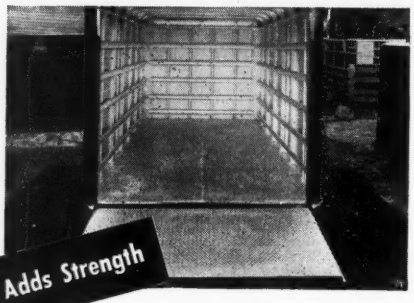


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# Sleepers in Defense Act Changes

**Defense Production Act amendments to condemn property, license business and set up production councils will be a blow to metalworking if they slip by Congress**

BUSINESSMEN are alarmed at the sweeping character of President Truman's 28 proposed amendments to the Defense Production Act which expires next June 30. Industrialists think that three of the amendments are particularly dangerous and, if adopted, could push us far down the road toward complete socialism.

The three revisions would institute a system of federal licensing for business, would set up national production councils that would make many decisions now the responsibility of management and would give authority to the federal government to construct any type of manufacturing establishment that is deemed necessary to aid the national defense.

**Revival**—The federal licensing proposal is similar in theory to the old Borah-O'Mahoney Federal Charters bill. The reasoning is that Washington could more easily enforce price ceilings with licensing regulations. That means that every business establishment, manufacturer, wholesaler or retailer, subject to price control, could be forced to secure a federal license as a condition of staying in business.

Such licenses may be suspended for 12 months by the President whenever he has reason to believe the holder of the license has violated any price control regulation, subject to certain appeals.

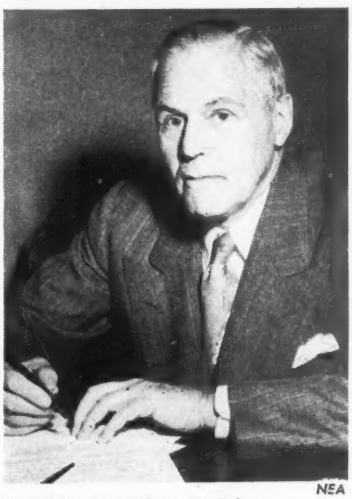
**The Hand of Mr. Murray**—Mr. Truman requests authority to provide for consultation with representatives of "businessmen, farmers, workers and consumers" before establishing price or wage regulations. The present law requires that such consultation be with "representatives of persons substantially affected" by the proposed order or regulation. As that has been interpreted, manufacturers of the particular product to be placed under a ceiling have been consulted through industry advisory committees composed of manufacturers only. The proposed amendment—requested by Philip Murray's CIO—directs the addition of labor, farmers and consumers to such industry advisory committees.

Naturally, on the new councils or committees, industry would have only one vote. The CIO has long campaigned for a production council. The only difference between the one submitted by the administration and the one by Mr. Murray is that the Murray plan calls for a government representative.

**Double Header**—The third dangerously sweeping power requested would be granted, business men believe, if two proposed amendments get by Congress. Part of the power lies in modifications asked in the authority to condemn real property. The present law permits the President to requisition such property under certain conditions, including an immediate payment of 75 per cent of the government's offer to the owner while the final requisitioning price is being determined in the courts. The amendment would permit the government to take immediate possession upon the filing of a petition in any court, without further hearings, and without any showing of a refusal to sell by the owner.

The property condemnation power would be strengthened in another proposed amendment that would empower the President to acquire property through condemnation and to construct whatever he sees fit in the way of government-owned and operated industrial facilities. No mention is made in the bill of any requirement that private industry be given the chance to meet the government needs for increased facilities before Washington steps in.

Identical bills carrying the amendments have been put into the Senate hopper as S. 1397 by Sen. Burnet R. Maybank (Dem., S. C.) and into the House hopper as H.R. 3871 by Rep. Brent Spence (Dem., Ky.).



NEA

IN TOP JOB: Edwin T. Gibson, executive vice-president of General Foods Corp., is acting head of Defense Production Authority. He succeeded William H. Harrison at the post

## Amortization Debate

**Are five-year tax writeoffs on defense facilities good or bad for the economy?**

"ACCELERATED amortization has been and will continue to be an extremely costly incentive to use in promoting expansion."

"ACCELERATED amortization will expand, rather than diminish, tax revenues of the federal treasury . . . and it has enabled American industry —at private expense—to enlarge defense production to a maximum degree in a minimum of time."

**Tax Debate**—Those two divergent views represent non-government stands on the question of the value of fast write offs which permit industry to amortize defense plant and equipment for tax purposes in five years. The first statement was made by Professors Robert Schlaifer, J. Keith Butters and Pearson Hunt of the Harvard Business School. The second was made by Irving S. Olds, board chairman of U. S. Steel Corp.

The Harvard professors say that fast amortization has three dangers: Companies that take advantage of the tax provision may be subject to heavy losses if the emergency ends in less than five years; firms which do not expand under the tax provision are exposed to the unfair advantage of competitors who under the present system may acquire more modern plants through extensive government aid; the federal treasury may lose substantial revenues in loss of corporate income tax receipts during the five-year amortization period.

**Rebuttal**—Mr. Olds says that the new law is a fair one that neither subsidizes nor enriches business at public expense. He denies that a company taking advantage of the tax provision gets any tax subsidy. That firm is merely getting back its own invested capital more rapidly than

## Certificates of Necessity By Industrial Classification

(Issued Through April 13, 1951)

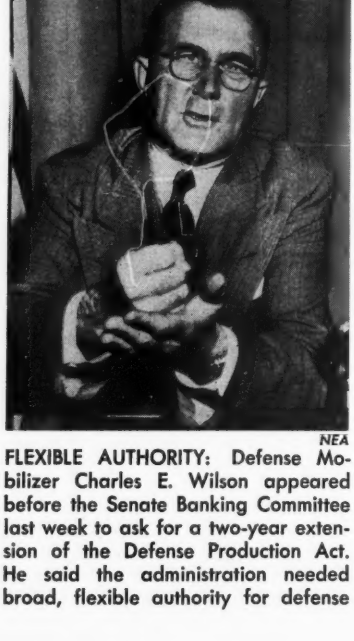
| | Millions of dollars Amount applied for | Tax amortization basis | Percent |
|---|---|---|---|
| **Basic materials—production:** | | | |
| Coal, coke and iron ore | 122.8 | 101.4 | 82.6 |
| Pig iron, ingots, casting, blooms, etc. | 1,592.2 | 1,166.2 | 73.2 |
| Nonferrous metals—pig, castings, etc. | 389.8 | 214.6 | 55.0 |
| Metal scrap, reclaiming | 8.1 | 6.1 | 75.5 |
| Refractories and materials | 61.0 | 51.4 | 84.2 |
| Fiber glass | 15.0 | 10.8 | 72.0 |
| Cement | 31.3 | 21.9 | 70.0 |
| Rubber, reclaiming | 1.6 | 1.1 | 68.8 |
| Cotton ginning | .7 | .4 | 57.1 |
| Lumber | .6 | .4 | 66.7 |
| Total | 2,223.1 | 1,574.3 | 70.8 |
| **Basic materials—processing:** | | | |
| Metal shapes and forgings | 480.1 | 307.8 | 64.1 |
| Gasoline and fuel oils | 368.3 | 291.0 | 79.0 |
| Chemical products | 441.3 | 230.0 | 52.1 |
| Textiles | 17.3 | 10.2 | 58.7 |
| Pulp and paper | 186.4 | 110.4 | 59.2 |
| Total | 1,493.4 | 949.4 | 63.6 |
| **Finished products:** | | | |
| Industrial equipment and components (equipment, tools, dies, abrasives, bearings, pumps, valves, etc.) | 62.6 | 48.9 | 78.1 |
| Transportation equip. (except automotive) | 15.5 | 10.5 | 68.0 |
| Automotive equipment and components | 32.8 | 26.6 | 81.1 |
| Electrical and electronic equipment | 43.8 | 32.8 | 74.7 |
| Aircraft | 303.7 | 198.1 | 65.2 |
| Ordnance, tanks, guns and ammunition | 43.4 | 36.4 | 83.9 |
| Guided missiles and rockets | 4.5 | 3.6 | 80.4 |
| Total | 506.3 | 356.9 | 70.5 |
| **Transportation and storage:** | | | |
| Rail, water, truck and storage | 458.2 | 351.7 | 76.8 |
| **Miscellaneous products and services:** | | | |
| Plasma, precision instruments, research testing, etc. | 28.0 | 21.0 | 75.0 |
| Grand Total | 4,709.0 | 3,253.3 | 69.1 |

normal, at a speed which is justified because the added facility will be of use to the government and the public for defense and may have limited private use.

Mr. Olds points out that any company is welcome to apply for fast amortization. He believes that the added earning power of expanding companies will add, not detract, from federal income tax revenues.

**Despite the Argument**—Whatever the merits of each side, the total value requested for a fast writeoff certification was $4.7 billion as of Apr. 13 (see the accompanying table). Nearly half of that was for basic production. But the rate of basic materials expansion is declining. If a breakdown had been made Jan. 30, 83 per cent of the total would have been for iron and steel.

Granted too late to include in this tabulation are more certifications. As of May 3, 1103 certificates had been granted since the program became effective Oct. 30, 1950. As of May 3, the total amount eligible for amortization was $5,088,939,786.



NEA

FLEXIBLE AUTHORITY: Defense Mobilizer Charles E. Wilson appeared before the Senate Banking Committee last week to ask for a two-year extension of the Defense Production Act. He said the administration needed broad, flexible authority for defense

# $60.7 Billion for Defense

### More than half that sum, asked for fiscal 1951-52, will be for metalworking

PRESIDENT TRUMAN wants Congress to give $60.7 billion in appropriations and contract authority to finance the U. S. arms program for the 1951-52 year starting July 1.

He estimates the Defense Department will actually spend $39.5 billion during the forth-coming fiscal period. About $34.7 billion will be spent for heavy equipment—including $14.5 billion for aircraft, $1.9 billion for shipbuilding and conversion, $13.3 billion for tanks, vehicles, artillery, ammunition and other major items.

**Modernization**—"Except for certain long lead items," Mr. Truman stated in his budget message, "procurement provided in the estimates substantially completes the program for modernization of tactical equipment for the Armed Forces." For the Army, the new funds will equip and maintain 18 divisions plus "separate combat and supporting units." The Navy will maintain "an active fleet" of 1161 ships, and the Marine Corps will maintain 2⅓ divisions "and other supporting units." The Air Force will continue to build toward 95 air wings. Some $130 million is budgeted for the guided missiles program.

Continued emphasis will be given to development of new and improved weapons. For those programs Mr. Truman asked Congress for $1.5 billion for research and development activities, compared with $1.2 billion for the current fiscal year. Another $143 million was included for "industrial mobilization activities." That is to finance the planning of the use of private industrial facilities, maintenance of government-owned machine tools and repair and upkeep of standby industrial plants. That $143 million is about half the amount okayed for the current fiscal year.

**A Lot of Money**—By June 30, 1951, orders for military equipment and construction totaling nearly $37 million will have been placed with industry since the start of the current fiscal year. During the first nine months of the present fiscal year, $24.1 billion has been obligated for the procurement of major equipment, supplies, military construction and expansion of production facilities.

Of the nine-month sum, $19.2 million went for aircraft, ships, tanks, weapons, ammunition and other hard goods; $31 billion went for clothing, subsistence and petroleum products; $1.8 billion went for military construction and facilities expansion.

## Tooling Up for CMP

**Here's list of regulations, forms and guides issued thus far for Controlled Materials Plan**

THE TOOLS you'll work with under the Controlled Materials Plan are coming off the printing presses.

The "first editions" hit the mails last week. If you don't have a copy of each of them you should obtain one. You'll need them to live under CMP.

The working tools that have been issued thus far are:

**1. CMP Regulation 1. (It defines rights and obligations under the CMP).**

**2. CMP Regulation 3. (It establishes preference status of delivery orders for materials).**

**3. Official CMP Class B Product List. (It lists under category headings the products CMP designates as Class B).**

**4. Product Assignment Directory. (It alphabetically lists products, designates those on the "A" list and those on the "B" list, and shows what NPA industry division handles them. Reprinted as an appendix to this directory is the Official CMP Class B Product List.)**

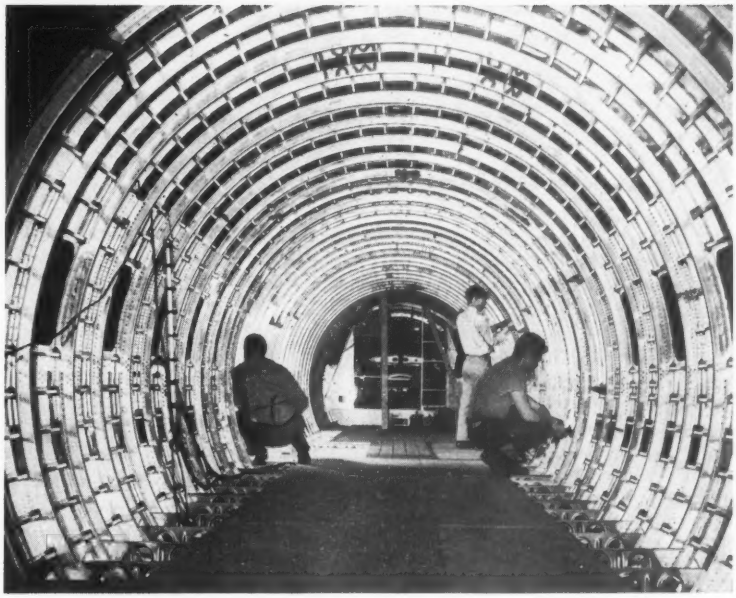
**5. Form CMP-4B. (It is an application for allotment of controlled materials for Class B products for the third quarter of 1951.)**

**6. CMP Regulation 2. (It sets limits on amounts of controlled materials a user is permitted to have in inventory).**

**7. CMP Regulation 4. (It establishes rules for delivery of steel, copper and aluminum by warehouses, jobbers, dealers and retailers).**

Other regulations to cover application of CMP procedures to specified segments of the industrial economy will follow. They include: CMP Regulation 5, maintenance, repair and operating supplies; CMP Regulation 6, construction; and CMP Regulation 7, parts and materials for repairmen.

Four schedules are attached to CMP Regulation 1. Schedule I names the forms and shapes of steel, copper and aluminum which make up the list of controlled materials. Schedule II reproduces a short form of allotment which may be used in making an allotment to a subcontractor for manufacture of an "A" product. Schedule III lists, item by item of controlled material, the number of days a delivery order must be placed in advance of the first day of the month in which shipment is required. Schedule IV lists the minimum mill quantities for which a controlled materials producer must accept orders.



GOING NOWHERE: Looking like the interior of a real plane under construction, Consolidated Vultee's first metal-mockup of the Convair-Liner 340 nears completion in San Diego, Calif. The dimensionally accurate mockup will simplify planning of interior components and efficient sequence of their installation in advance of actual production

The "Official CMP Class B Product List" itemizes more than 4000 manufactured articles containing steel, copper or aluminum which, under the CMP, are designated as Class B products. This list shows "B" products under category headings and indicates the particular NPA industry division to which manufacturers of each should apply for authorized production schedules, allotments of controlled materials and defense ratings.

NPA said a manufacturer should first determine whether his product is included in the Class B product list, then familiarize himself with the provisions of CMP Regulations 1 and 3, which make clear the basic pattern of operations under CMP. The manufacturer, if his product falls under CMP, should then read the instruction sheet which accompanies application form CMP-4B, fill out the form, and return it before May 31 to the NPA industry division or other agency indicated in the "B" list.

The "Product Assignment Directory" lists some 13,000 items and indicates the NPA industry division handling the product.

## Here's Your CMP Meeting Date

Better check again on the date of the Controlled Materials Plan educational meeting for your area if you're planning to attend it. Date changes have been made for several cities.

Here's the revised schedule: May 15—Detroit, Chicago; May 16—Minneapolis, Philadelphia, Houston; May 17—Seattle, Boston, Dallas; May 18—Portland, Oreg., Denver, New York, New Orleans; May 21—San Francisco, Kansas City, Mo., Cleveland, Atlanta; May 22—Los Angeles, St. Louis, Pittsburgh; and May 23—Richmond, Va.

The meetings in these 20 cities are to be sponsored by field offices of the U. S. Department of Commerce, with the assistance of such business groups as chambers of commerce and trade associations. Hour and place of each meeting and other arrangements will be announced by the Department of Commerce field office concerned.

## A Program of Quality

"Quality Control in Military Procurement" will be the chief discussion topic at the fifth national convention of the American Society for Quality Control, May 23 and 24 in Cleveland's Public Auditorium.

Military speakers will define "What the Armed Services Expect of the Contractor's Quality Control Department" and "Principles and Practices of Military Standard 105-A." Standard 105-A is the services' overall ac-

ceptance measure. Rear Adm. M. L. Ring, director of supply management, Munitions Board, will address the luncheon meeting May 24 with a talk titled "Problems of Military Procurement."

## United Gets Billet Mill Orders

Two billet mills for United States Steel Co.'s new Fairless Works near Morrisville, Pa., will be built by United Engineering & Foundry Co., Pittsburgh.

One is to be a 30-inch six-stand continuous vertical and horizontal billet mill and the other is to be a 21-inch four-stand continuous vertical and horizontal billet mill.

Both mills will produce billets, rounds and slabs, the 30-inch mill rolling the larger sizes and the 21-inch mill rolling the product of the larger mill into smaller sizes as required.

## Building Mill for Fairless Works

A high speed, fast reversing 40-inch blooming mill for U. S. Steel Co.'s new Fairless Works is being built by Continental Foundry & Machine Co., East Chicago, Ind.

While the new unit is primarily an intermediate blooming mill for rolling partially reduced ingots down to blooms suitable for the billet mill it is designed also to take 10-ton ingots and complete the entire rolling operation from ingot to bloom in an emergency.

## Westinghouse Gets J. & L. Job

All of the electrical equipment for the 46-inch blooming mill to be installed in the Jones & Laughlin Steel Corp.'s South Side Works at Pittsburgh will be provided by Westinghouse Electric Corp., Pittsburgh. Value of the order is approximately $2.5 million.

Special control features of the equipment, designed to provide rapid reversal of the rolls, will make the new mill among the fastest of similar size yet developed.

The massive rolls of the new mill will be driven by two 5000-horsepower motors, operating in a speed range of from 40 to 100 revolutions a minute.

As part of the drive system, a 72-ton flywheel is to be attached to the motor-generator set. Under some rolling schedules, the peak electrical load may rise to 275 per cent of the normal rating of the motor; stored energy in the flywheel is released to assist the motor-generator system in meeting these extraordinary demands.

FABRICATING THE 75-TON PRESS
*. . . National Supply does the job*

## Boeing Stretches A Point

Sheet metal, rolled sections and extrusions for use in aircraft frames and skins are literally stretched into place at Boeing Airplane Co.'s Wichita, Kans., division plant.

Here fuselage skins for the B-47 Stratojet take shape by a process known as stretch-wrap forming. The job is done in what is little more than one easy operation on a Hufford sheet stretch press weighing 75 tons and having 150-ton capacity. Hufford Machine Works Inc., Redondo Beach, Calif., designed the press; many of the large fabricated sections of the machine were made at the Torrance, Calif., plant of National Supply Co.

Stretch-wrap forming raises yield strength of the metal as much as 20 per cent and its ultimate strength as much as 10 per cent.

The press in the photograph at the bottom of the page was moved halfway across the nation to the Boeing plant.

## Northwestern Gets Red Mill

A steel mill originally destined for shipment behind the iron curtain will be installed as part of Northwestern Steel & Wire Co.'s $13 million expansion at Sterling, Ill. The mill was ordered by Poland, but languished for months at Newark, N. J., port until it was finally sold to Northwestern.

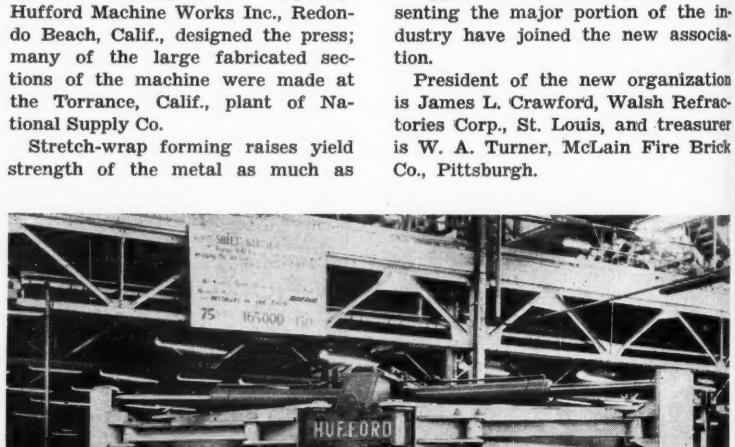
Northwestern now has three electric steelmaking furnaces; the largest is 17 feet in diameter. It has ordered two more, rated at 125-130 tons in capacity for each. The new mill, to roll ingots into blooms and slabs, will be in operation later this year.

## Refractories Institute Formed

Refractories industry members formed a new trade association. Its name is The Refractories Institute. Purpose of the institute is to promote demand for products of the refractories industry, spur research into products and processes, and co-operate with government agencies in the interest of the public and the industry.

Approximately 40 companies representing the major portion of the industry have joined the new association.

President of the new organization is James L. Crawford, Walsh Refractories Corp., St. Louis, and treasurer is W. A. Turner, McLain Fire Brick Co., Pittsburgh.




FORMING B-47 TAIL CONE SECTION ON A HUFFORD PRESS
*. . . almost any cross-sectional shape can be formed*

## Warehousemen's Choices

The American Steel Warehouse Association re-elected L. B. Worthington as chairman of its executive committee and Walter S. Doxsey as its president and secretary. The elections took place in Chicago at the association's annual meeting.

Elected as vice presidents are Ben H. Knipe, Markle Steel Co., Houston, and Donald C. Lott, Ft. Duquesne Steel Co., Pittsburgh.

Paul O. Grammer was re-elected treasurer.

New members of the executive committee are: F. H. Lovejoy, Wheelock, Lovejoy & Co., Cambridge, Mass.; Wayne Rising, Ducommon Metals & Supply Co., Los Angeles; and J. F. Rogers, Beals, McCarthy & Rogers, Buffalo.

## Distributors Ponder CMP

There's a puzzled look on many a steel warehouseman these days. It comes from trying to figure out whether their steel stocks will improve or deteriorate further under the coming Controlled Materials Plan.

Some distributors think CMP will prove to be an illusion for small consumers unless provision is made under the plan to keep warehouse inventories at satisfactory levels. Warehouse stock turnover is rapid and current inventories are only 30 per cent of normal.

Stocks are low countrywide. NPA's amended order M-6 is being felt, however, and benefits should be even more pronounced in June, distributors say.

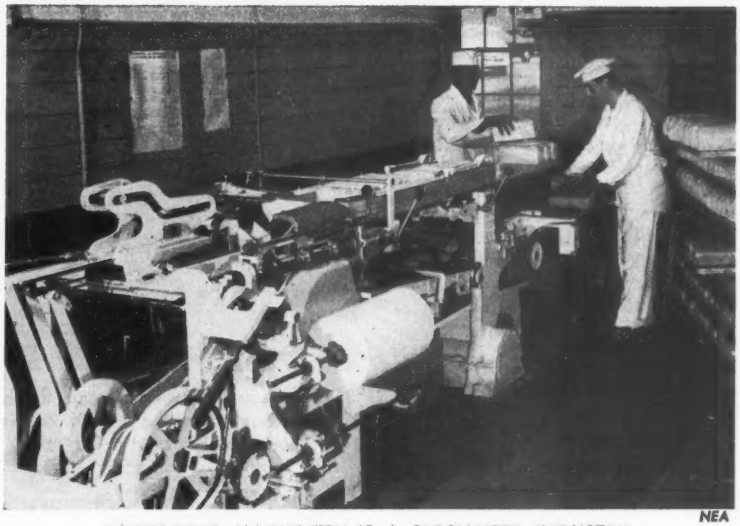
Imminent is a warehouse pricing regulation. This is expected to establish ceilings based on the individual operator's costs, including mill base prices, plus extras and freight, along with the customary markup.

## What's the Market Price?

The National Production Authority last week heard testimony on Bethlehem Steel Co.'s request for permission to refuse sale of steel to a warehouse company on the grounds that the latter's retail price is too high.

A special NPA review board which conducted the hearing will make recommendations to Administrator Manly Fleischmann for decision.

The matter involved the application of NPA order M-6 which requires steel producers to fill defense rated (DO) orders first and then distribute the remaining supply to their regular customers including warehouses.



NEA

PACKAGING MACHINERY IS A SPECIALIZED INDUSTRY
*. . . everything from bread-wrapping to cigar labeling*

## Specialists Suffer

**Makers of special machinery, such as packaging equipment, getting little defense work**

HOW does an industry making special purpose machinery fare when trying to participate in the defense program?

"Not very well," is the consensus among the 75 or so companies that make standard packaging machinery other than that used in carbonated beverage bottling. One reason is that the packaging machinery industry is small and specialized in itself, but to add to the difficulty, there is little uniformity among the companies in the field. One specializes on bread wrapping devices, another on machinery to fill ice cream packs. The diversity makes it hard for Washington to deal with the entire industry, and action often has to be taken on company basis.

**Slim Pickings**—As a result, the industry generally is now devoting only about 1 per cent of its output to direct defense orders. Most of that is for drug packaging equipment. Much of its other DO business comes from maintenance, repair and supply contracts, for some 20 per cent of its total production is required for MRO work. Packaging machinery makers will be under CMP, but few are optimistic about the aid that will give. The industry could convert to 65 per cent defense production. During World War II, most companies devoted at least half their output to defense; some devoted all.

Generally, the industry's operations fall into these categories: Dry and liquid filling, wrapping, labeling, bottle capping (but not crown capping as used in carbonated beverages and beer), box and container making and bag making machinery. Food, drugs, textiles and tobacco are the leading products packaged by automatic equipment. Frozen food packing is a rapidly increasing business, as is packaging meat for self-service counters. One new machine wraps cigars and labels them with bands all at the same time. Another device folds and seals wraps on chewing gum at the rate of more than 600 units per minute. Equipment to pack margarine is selling unusually well.

**Normal Business Good** — Despite materials shortages and lack of defense work, the industry is operating at or near capacity. Its physical volume is 75 to 100 per cent higher than in 1939, so rapid has the need grown for automatic packaging machinery in the past decade. The industry turning out the standard equipment employs less than 10,000, says Packaging Machinery Manufacturers Institute. The producers must devote a good deal of their time and money to development work, particularly now that plastics have opened new packaging vistas. One development is stretch wrapping in which an irregular-shaped product is thrust into a sheet of wrapping materials and the latter is stretched to contour without air space and sealed. Another new technique is skin wrapping. Dipped into hot water, the wrapping material shrinks to make an air-tight closure. About 12 of the

75 companies in the business turn cut most of the production. A typical company among that dozen has 80 different models.

Plagued by materials shortages, the industry is forced to begin operating cn a hand-to-mouth basis. Some 42 per cent of its total materials requirements are for cast iron, 23 per cent for cold-rolled steel bar stock, 8 per cent for hot-rolled steel bar stock, 3 per cent for hot-rolled small steel shapes, 9 per cent for alloy steel and 15 per cent for aluminum, brass, copper and steel wire.

## Another Lake Freighter Ordered

The keel will be laid early next fall for the 16th Great Lakes freighter ordered by American shippers since the Korean War began.

The vessel will be a 640-foot ore carrier to cost $5.5 million. It was ordered by Great Lakes Steamship Co., Cleveland, for delivery in August, 1952, by Defoe Shipbuilding Co. at its Bay City, Mich., yards.

## Opportunity: $300 Million Worth

Lockheed Aircraft Corp., distributor of $132 million in supplier and subcontracting orders in 1950, plans to increase this total 127 per cent to an estimated $300 million in 1951.

This good news for companies seeking subcontract opportunities is revealed in Lockheed's new pamphlet report on its purchasing operations. Further breakdown of the company's purchasing shows about 40 per cent —or $125 million—of the 1951 orders will go to nearly 3000 suppliers in the Los Angeles area.

Lockheed expects subcontracting to free up to 40 per cent of the company's factory floor space for expanded final assembly operations.

## Publicizing Pending Purchases

Military procurement offices will soon begin releasing advance information on unclassified proposed negotiated procurements of the Army, Navy and Air Force. The new information will be added to the daily synopses of advertised bids issued by the Department of Commerce.

Under the new policy, announced by John D. Small, chairman, Munitions Board, negotiated and advertised procurements exceeding $10,000 made in continental U. S., will be publicized when scheduled to be opened 18 days or more from date of issue. All U. S. purchasing offices will transmit synopses for publication. Previously only principal offices were required to report formally advertised procurements.

Wide World

STREET SCENE: Plowing through the business district of Joliet, Ill., the 620-foot *Cliffs Victory* nears the end of its inland voyage to join the Great Lakes ore fleet. The big boat squeezed through a 600-foot lock at Lockport, Ill.

# STEEL's Weekly Summary of Subcontract Opportunities

MANY of the large defense contract awards received by prime contractors call for building new plants to accommodate the projects, and so are of limited immediate opportunity to companies seeking subcontract or supplier connections.

Such is the case at Lincoln-Mercury Division of Ford Motor Co., where manufacture of the Navy's new J-40 jet engine is the latest big defense commitment. Production is permitted under a licensing agreement signed with Westinghouse Electric Corp., which developed the model for the Navy.

Although preliminary engineering to prepare for manufacture is underway, the division is many months from actual production since the engines will be turned out in a new plant to be built on a site as yet unannounced by the company. A large percentage of the parts for the new model eventually will be subcontracted, reports Henry Ford II.

Of more immediate interest to suppliers is the $55 million defense contract load now carried by Electric Auto-Lite Co., Toledo, O. Receipt of a new award to make 90-millimeter shell casings for the Army raises commitments to this amount, says Royce G. Martin, president. Value of the new award was not disclosed.

Other contracts, of interest to the metalworking industry, follow:

| PRODUCT | CONTRACTOR |
|---|---|
| Meter Assemblies (aircraft) | Ralph M. Brodie Co., Oakland, Calif. |
| Radio Transmitters | Collins Radio Co., Cedar Rapids, Iowa |
| Transformers | McGraw Electric Co., Milwaukee |
| Amplifier Systems | Century Geophysical Corp., Tulsa, Okla. |
| Carburetor Assemblies (aircraft) | Chandler-Evans Div., Niles-Bement-Pond Corp., West Hartford, Conn. |
| Motors (horizontal stabilizer actuators) | Electrical Engineering & Mfg. Co., Los Angeles |
| Embossing Machines | Addressograph-Multigraph Corp., Cleveland |
| Utility Trailers | Knox Metal Products Inc., Waynesboro, Ga. |
| Towing Tractors | American Coleman Co., Omaha, Neb. |
| Turbochargers | Pneumatic Tire Co., Huntington Park, Calif. |
| Adding Machines | Victor Adding Machine Co., Chicago |
| Diesel Engine Generator Sets (naval) | Fairbanks, Morse & Co., Chicago |
| Motor Generator Sets | Cleveland Diesel Div., General Motors Corp., Cleveland |
| Motor Generator Sets (25 kva) | Electro-Dynamic Works, Electric Boat Co., Bayonne, N. J.<br>Continental Electric Co. Inc., Newark, N. J.<br>Bogue Electric Mfg. Co., Paterson, N. J. |
| Pulse Generators | Harvey-Wells Electronics Inc., Southbridge, Mass.<br>Stewart & Stevenson Services Inc., Houston |
| Paving Mixers | Foote Co. Inc., Nunda, N. Y. |
| Concrete Mixers | Chain Belt Co., Milwaukee<br>Worthington Pump & Machinery Corp., Harrison, N. J.<br>Kwik-Mix Co., Port Washington, Wis. |
| Road Graders—Engine Driven | Austin-Western Co., Aurora, Ill. |
| Ditchers—Engine Driven | Cleveland Trencher Co., Cleveland |
| Pumps—With Motors | Nash Engineering Co., S. Norwalk, Conn. |
| Pumps—Air Conditioning Circulating | Warren Steam Pump Co., Warren, Mass. |
| Lathes (14 x 30 inches) | American Tool Works Co., Cincinnati |
| Horizontal Boring Machines | Lucas Machine Div., New Britain Machine Co., Cleveland |
| Press Brakes | Dreis & Krump Mfg. Co., Chicago |
| Engine Lathes | Lodge & Shipley Co., Cincinnati<br>Sidney Machine Tool Co., Sidney, O. |
| Conveyors (portable) | A. B. Farquhar Co., York, Pa. |
| Nailing Machines | Morgan Machine Co. Inc., Rochester, N. Y. |
| Switchboards | Automatic Electric Sales Corp., Chicago |
| Microphone Headsets | Duke Mfg. Co. Inc., Linden, N. J. |
| Radio Sets | Raytheon Mfg. Co., Waltham, Mass.<br>Federal Telephone & Radio Corp., Clifton, N. J. |
| Radio Terminal Sets | Hallicrafters Co., Chicago |
| Teletypewriter Sets | Kleinschmidt Laboratories Inc., Deerfield, Ill.<br>Teletype Corp., Chicago |
| Motor Generators | Homelite Corp., Port Chester, N. Y. |
| Range Finders | Otis Elevator Co., New York |

# CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to U. S. Commerce Department, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg., Washington 25. For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temporary E Bldg., Washington 25.

## Controlled Materials Plan

CMP Regulation 1 issued May 3, 1951, and effective that date, defines rights and obligations under the Controlled Materials Plan and explains how production schedules will be authorized for defense-supporting manufacturing operations and how controlled materials (steel, copper and aluminum) will be allotted for completion of authorized production.

CMP Regulation 2 issued May 10, 1951, sets limits on amounts of controlled materials a user is permitted to have in inventory.

CMP Regulation 3 issued May 3, 1951, and effective that date, establishes the relative preference status of delivery orders for controlled materials and other materials needed for production of goods deemed essential to the rearmament program and the general economy.

CMP Regulation 4 issued May 10, 1951, establishes rules for delivery of steel, copper and aluminum by warehouses, jobbers, dealers and retailers.

CMP "B" PRODUCT LIST—The "Official CMP Class B Product List" showing "B" products under category headings and indicating the particular NPA industry division to which manufacturers of each should apply for authorized production schedules, allotments of controlled materials (steel, copper and aluminum), and defense (DO) ratings was issued May 3, 1951, by NPA.

PRODUCT ASSIGNMENT DIRECTORY—A "Product Assignment Directory" alphabetically listing some 13,000 items, showing whether they are "A" or "B" products, and indicating in each case the NPA industry division handling the product was issued May 7, 1951, by NPA.

APPLICATION FORM — Application form CMP 4-B to be used in applying for allotments of controlled materials (steel, copper and aluminum) needed for production in the third quarter of 1951 was issued May 4, 1951, by NPA.

## Materials Orders

AUTOMOBILES—Amendment of May 4, 1951, of NPA Order M-47 reduces use of steel for manufacture of passenger automobiles and station wagons for June from 80 per cent to 75 per cent of the monthly rate of usage in the first six months of 1950. NPA indicated that usage of steel for passenger automobiles and trucks during the third quarter of 1951 will be limited to following percentages of base period rates: Passenger cars, 70; light trucks, 70; medium trucks, 100; and heavy trucks, 120.

PACKAGING CLOSURES—Interpretation 1 issued May 4, 1951, to NPA Order M-26 stipulates that packers who use aluminum lids or other types of aluminum sealing devices must include in their inventory count all closures in their possession or held by others for them.

CONSTRUCTION—Amendment of May 3, 1951, of NPA Order M-4 requires NPA authorization for construction of large apartment houses, luxury residences, all industrial facilities and public and private construction projects which require the use of more than 25 tons of steel. Amendment effective May 3, 1951.

## NPA Delegation

In Delegation 11 the National Production Authority authorizes the Defense Electric Power Administrator to re-delegate to the Rural Electrification Administrator certain functions of DEPA relating to priorities assistance for REA electric utility borrowers. Delegation 11 was effective May 4, 1951.

## Price Regulations

NICKEL SCRAP—Ceiling Price Regulation 29 effective May 8, 1951, and issued by the Office of Price Stabilization cuts back ceiling prices on pure nickel scrap to a base of 40.5 cents a pound.

SPECIAL DEALS — Supplementary Regulation 26 to General Ceiling Price Regulation issued by the Office of Price Stabilization permits adjustment of ceiling prices established under the GCPR for manufacturers and wholesalers whose prices are abnormally low because of a "special deal" in effect during the period from Dec. 19, 1950, to Jan. 25, 1951. Supplementary Regulation 26 was effective May 4, 1951.

IMPORTS—Ceiling Price Regulation 31 issued by Office of Price Stabilization provides price controls on imported goods other than strategic materials and those considered essential to military and civilian needs. CPR 31 was effective May 9, 1951.

REPORTING CODE—Amendment 1 of Ceiling Price Regulation 22 gives the code numbers to be used by manufacturers in filling out Form 8, which must be filed with the Office of Price Stabilization no later than May 28, 1951, by all manufacturers subject to CPR 22.

EXPORT CONTRACTS—Revision 1 of Supplementary Regulation 9 under the General Ceiling Price Regulation allows producer exporters to fulfill contracts for export sales entered into before the GCPR was issued Jan. 26, 1951. This action revises an earlier regulation which permitted fulfillment of contracts made by merchant exporters only.

INTERPRETING GCPR—Interpretations 3 through 43 of the General Ceiling Price Regulation were issued May 4, 1951, by the Office of Price Stabilization.

TUNGSTEN PRODUCTS — Ceiling Price Regulation 33 issued by Office of Price Stabilization sets dollars-and-cents ceiling prices on ferrotungsten and other tungsten products. The new ceilings, applying to imports as well as domestic products, were effective May 7, 1951. They represent an increase over prices frozen by the General Ceiling Price Regulation of Jan. 26, 1951, reflecting at least part of the higher cost of tungsten concentrates from which the products are processed. A ceiling of $65 a short ton unit was placed on tungsten concentrates by CPR 19 issued Apr. 6, 1951.

## Steel Production Rate Faster

Production of steel for ingots and castings in April was next to the lowest monthly output thus far this year, yet the daily rate in April was greater than in any of the three preceding months of 1951.

April production totaled 8,832,000 net tons, the American Iron & Steel Institute reports. That was exceeded by the March output of 9,050,000 tons and January's 8,843,167. April's total was lower because that month has one less day than March and January.

Reflecting the faster daily pace in April is the institute's report that the industry operated at 103 per cent of capacity then, compared with 102.2 per cent in March and 99.9 per cent in January. The February rate was 97.1 per cent.

The April production total was comprised of 7,845,000 tons of open-hearth steel, 392,000 tons of bessemer, and 595,000 tons of electric furnace steel.

## Steel Shipments Set Record

Chalk up another new record for the steel industry!

Tabulations just completed show it shipped more finished steel in March than in any previous month. Shipments that month totaled 7,105,078 net tons and marked the first month in which they went over the 7-million-ton mark, says the American Iron & Steel Institute.

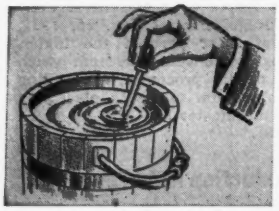
The rise in March shipments was due mainly to greater tonnages of heavy products, such as structural shapes, plates, rails and railroad wheels and axles.

A year ago, plate comprised 7.7 per cent of all finished steel; now it's 9.6 per cent. Structural shapes were taking 5.8 per cent a year ago; now they're taking 6.4 per cent. A year ago, hot-rolled sheets accounted for 11.1 per cent and cold-rolled sheets, 13.7 per cent. Now the percentages are 10.6 and 12.7, respectively.

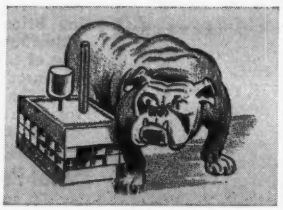
Shipments of 51,022 tons of stainless in March were nearly 40 per cent higher than a year earlier, while shipments of 504,297 tons of other grade of alloy steel were up 37 per cent.

# Windows of Washington

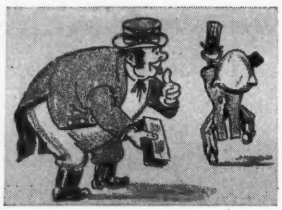
By E. C. KREUTZBERG *Washington Editor*



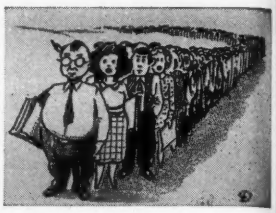
**BUDGET REVISIONS**
*. . . drop from the bucket*



**SECURITY WATCHDOG**
*. . . to each his own*



**SHREWD TRADING**
*. . . deal won't go through*



**FEDERAL EMPLOYEE PARADE**
*. . . the line grows longer*

HOUSE ADVOCATES of economy trimmed only $886 million from the budget requests of $24 billion when they passed the first four big money measures for fiscal 1952.

| | Budget request | Voted by House |
|---|---|---|
| Treasury—Post Office | $2,958,125,000 | $2,918,827,000 |
| Labor—Federal Security | 2,732,253,760 | 2,641,206,361 |
| Interior | 559,286,000 | 496,764,500 |
| Independent Offices | 6,837,677,465 | 6,144,540,355 |

Main cuts in the Interior bill were at the expense of construction programs of the Bonneville, Southeastern and Southwestern Power Administrations and the Bureau of Reclamation. Materials and manpower needs of the defense program were at least a factor in causing the ax to be swung.

Private enterprise will be gratified by one feature of the House's action on the Interior bill: Adoption of an amendment prohibiting the use of federal funds to construct power transmission facilities duplicating those of private companies.

Main economy in the Independent Offices bill came from an estimated reduction in loans that would come from the House-passed limit of 5000 public dwelling unit starts in fiscal 1952. But the most spectacular cut was that in the President's emergency fund; the request was $25 million but because about $4 million to $5 million will remain available from fiscal 1951 the House voted for only $1 million.

All the money bills contain the Jensen amendment. It would allow the government departments and agencies to replace only 25 per cent of those leaving government employment in fiscal 1952. If precedent is any guide, though, the Senate will restore many of the items hacked out of the appropriation bills by the House.

## System Against Sabotage . . .

The Munitions Board is working out a system to assign every manufacturing plant and industrial facility to some government agency for advice and assistance in guarding against espionage and sabotage. So far limited assistance along these lines is furnished by the Department of Defense which conducts security surveys at major defense plants. Recently it issued a booklet entitled "Industrial Security Manual for Safeguarding Classified Matter." Under the coming setup, protection of transportation facilities will be the responsibility of the Interstate Commerce Commission, power generating plants will be assigned to the Federal Power Commission, communications facilities to the Federal Communications Commission, basic raw materials production to the Interior Department, etc. Details will be announced "within a few weeks."

## Answers to Price Problems . . .

If you are in doubt as to what you can do and what you can't do under recent price regulations, you can get dependable answers by putting your questions to the following Office of Price Stabilization officials, all reachable on STerling 4200:

On CPR 22 (Manufacturers' General Ceiling Price Regulation): Harold Leventhal, Extension 2594; Robert Faragher, Ext. 8902; F. Stewart Stranahan, Ext. 4484.

On CPR 30 (Machinery and Related Manufactured Goods): Irwin Lerten, Ext. 5039; L. W. Wallace, Ext. 3519; F. Stewart Stranahan, Ext. 4484.

On CPR 5 (Iron and Steel Scrap): Roland Brown, Ext. 8061.

## Exceptions to Reciprocities . . .

Government officials again have been reminded during the past week that the British are shrewd traders. The British have come up with a proposed agreement for common use on a royalty-free basis, in furtherance of the mutual defense assistance pact, of patents owned by the United States and British governments. The agreement calls for a reciprocal arrangement, but scrutiny of the document reveals some far-reaching exceptions. Under the British proposal we would use their patents on a royalty-free basis only for production of actual weapons. We would pay royalties for the use of patents on jet engines, instruments, and other components of weapons. Vital patents owned by the British government-owned National Research & Development Corp. and Power Jets Ltd. would be exempted from the reciprocal deal. They would be covered by a separate agreement, to be negotiated later, whereby we would pay royalties. Our government officials predict that the deal will not go through exactly as the British have proposed.

## Bad News for Taxpayers . . .

More bad news for taxpayers is contained in the latest report of the Byrd committee which showed 2,364,070 civilians in the employ of the federal government at the end of March, an increase of 56,166 over February. Further increases lie ahead as the defense agencies continue to add to their personnel.

## Science Foundation Opens . . .

Newest government agency, the National Science Foundation, opened offices at 901 Sixteenth St., N. W., Washington; STerling 0706 is the telephone number. There Dr. Alan T. Waterman, director of the foundation, holds forth with three staff men appointed to date: Dr. Charles E. Sunderlin, deputy director; William A. W. Krebs Jr., general counsel; and Dr. Lloyd M. Trefethen, technical aide to the director and executive secretary. All three formerly served under Dr. Waterman in the Office of Naval Research.

## The Seaway Project . . .

Having concluded its hearings on the proposed St. Lawrence-Great Lakes seaway, the House Committee on Public Works is holding executive sessions to frame the authorizing bill it plans to report.

# Efficient-Safe BAKER Electric Fork Truck

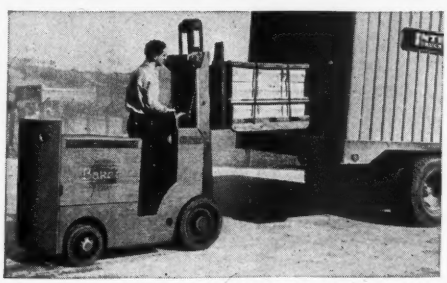
★ Mechanizes handling in hazardous areas
★ Reduces man hours for handling
★ Increases storage capacity
★ Speeds loading and unloading

**at NORGE DIVISION of The Borg Warner Corp., Chattanooga, Tennessee**

This Baker Truck is the only mechanized handling equipment permitted to operate in the oil-storage house, where it saves time and space by handling and tiering drums of flammable material.

● This BAKER Battery-Powered Fork Truck makes it possible for the Norge plant in Chattanooga to realize the cost-saving benefits of mechanized handling in unit loads throughout all departments. By removing the drudgery and strain of hand trucking and hand lifting, many man-hours have been transferred from handling to productive work. Hitherto inaccessible areas are made available for storage. Faster unloading and loading has reduced turn-around time for carriers, and faster inter-plant movement of materials has greatly increased production efficiency.

**TODAY MORE THAN EVER**—*Manpower savings* and *more available productive space* are of prime importance. Proper use of Fork Trucks can often eliminate need for new warehouse construction. A Baker Material Handling Engineer will show you how to gain these benefits in your plant.



Unit loads on skids are unloaded at car door by the Baker Fork Truck. They are moved from carrier to stock room and tiered in one operation. Suppliers are instructed to ship on pallets when possible.

★

Incoming and outgoing shipments on highway trucks are also handled by Fork Truck. Incoming castings and forgings are placed in special skid-type containers on arrival, and handled by the truck.

★

Space above office enclosures within the building is made available for storage by the Baker Fork Truck. By thus freeing floor space for productive work, and by gaining additional space through tiering in other storage areas, Norge has saved the cost of building additional warehouse capacity which was required.

**BAKER INDUSTRIAL TRUCK DIVISION** *of The Baker-Raulang Company*

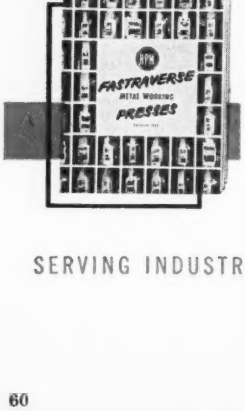
1259 WEST 80th STREET, CLEVELAND 2, OHIO • *In Canada: Railway & Power Engineering Corporation, Ltd.*

**Baker® INDUSTRIAL TRUCKS**

# H-P-M's PUT THE "HEAT" ON DEEP DRAWS *at Modine*

Modine, one of the country's largest manufacturers of heat transfer equipment, has found H-P-M "all-hydraulic" presses to be a profitable answer to their sheet metal drawing operations. One of the 7 H-P-M's at work in Modine plants is pictured at the right, deep drawing casings for unit heaters.

Modine, like the many H-P-M users, has found that H-P-M FASTRAVERSE Presses can easily handle deep intricate draws in all types of sheet metal—at production rates and with minimum rejects (less than 1% in most cases). Exclusive H-P-M design and "all-hydraulic" operation enable you to form without wrinkling or tearing—the draw is cushioned at first contact with the work and maintained at pre-determined speeds and pressures. Now is the time to check with an H-P-M Sales Engineer for the complete, profitable details—write today.




A copy of H-P-M's new Bulletin 5005 describing H-P-M's complete line of metal working presses is yours for the asking. Simply request it on your company letterhead.

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HPM

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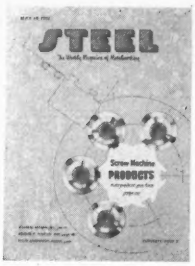
*Makers of Presses for the Metal Working and Processing Industries - Plastics Molding Presses - Die Casting Machines Hydraulic Pumps, Valves and Power Units.*

# A Big Oak from Little Acorns

**More than 1500 screw machine product companies, half of which have annual sales under $100,000 a year, expect to do at least $240 million in total 1951 business**




THE SKY'S THE LIMIT on the variety of different components one of those complex automatic screw machines can turn out. But major products the jobbing shops in the industry make include set screws, nuts, fittings as components in every end product that moves and many that do not.

AN INDUSTRY in which more than half the companies have annual sales of less than $100,000 a year expects to turn out at least $240 million worth of products in 1951.

The more than 1500 U. S. companies whose primary activity is the manufacture of screw machine products had estimated shipments of $240 million in 1950. Harry F. Fischer, secretary-treasurer of Fischer Special Mfg. Co. and president of the National Screw Machine Products Association, says, "Business looks better for 1951 than 1950."

**Gaining** — The industry this year will have dollar sales 356.3 per cent higher than the $52.6 million volume in 1939, but the level is still below wartime peaks when 30 million screw machine parts were turned out, in 1942. Despite the dollar gain since 1939, the average company has lower dollar sales today than before World War II. Why? Because there has been about a 400 per cent increase in the number of screw machine products companies since 1939. Only one other metalworking industry, that which manufactures miscellaneous electrical industrial apparatus, has had a greater increase in the number of companies. The screw machine products companies today employ about 30,000 production workers, only about 150 per cent more than were on the payrolls in 1939.

The industry is highly competitive, not only because of the increase in number of companies but because of competition from captive screw machine departments. The more than 1500 firms in the industry proper have about 18,000 automatic screw machines, but about another 3000 companies not engaged primarily in screw machine product manufacture own some 20,000 machines. Most of those 20,000 units are used primarily for limited purpose work. Industry production and other statistics don't include those for captive shops.

**The Sky's the Limit**—A screw machine is a complex, automatic lathe that turns out special metal parts from bar stock and tubing. Virtually everything that moves, and many things that do not, contain screw machine parts. Despite its name, the industry makes no standard screws, only special ones. Before 1900, manufacture of standard screws was a profitable phase of the business, but development of the cold-heading process put an end to that. The range of products that can be turned out on a screw machine is endless, limited only by the imagination and skill of the layout and set up men. The items vary from 9½-inch lock nuts on tank drive shaft bearings to 1/32-inch watch stems.

Screw machine products are components that go into an end product, such as automobiles, aircraft, electrical equipment and appliances and business machines. Many companies in the industry turn out end-products, but strictly speaking those items aren't screw products. The Norden bombsight of World War II had 1733 screw machine parts in it; an ordinary aircraft carburetor has more than 500; a calculating machine about 1250.

**Ubiquitous** — The screw machine product is everywhere, but, on the average, its value is less than 1.5 per cent of the sales price of a final product. Even the 1250 parts in the calculating machine account for only 5 per cent of the sales price of the completed device.

Because of that fact, because of fierce competition in the industry and because many people in it are content with modest, not sensational, sales levels, screw machine products firms are mostly small. Some 25 per cent of the companies in the industry employ more than 20 people and do most of the volume. Among those larger companies, the average firm does a business of about $1 million in gross sales a year and has a little less than 100 production employees. Only 4 per cent of the companies have more than 100 employees. Any company doing more than $1.5 million in gross sales is large for the industry.

A company in the larger group doing less than $600,000 sales is considered small.

**Varied** — Among those in the top 25 per cent, one typical company produces 240 separate screw machine items now, compared with only 80 after World War II. So versatile are screw machines that the number of different products being turned out can shift widely from quarter to quarter.

Nine companies in the United States make virtually all of this country's automatic screw machines. Every year those units are becoming more intricate, more precise as the screw machine product industry's need for close tolerances and high quality increases.

Competition is one factor pushing engineering standards up, for companies must compete on the basis of quality as much as price, since

SCREW MACHINE INDUSTRY: $240 MILLION WORTH OF BUSINESS IN 1951

*. . . the range of products is almost endless*

price of screw machine products is usually such a minor part of the total cost of a final product. But defense work, with its demand for high quality, is another factor pushing standards up. In March, the latest month for which comprehensive figures are available, the industry was doing 24 per cent of its volume for the government. A few firms are already doing 50 per cent or more war work. The average is undoubtedly higher now. So vital are screw machine parts in defense weapons that if 30 per cent of the total economy were devoted to defense, 60 per cent of the screw machine production would be needed for defense.

**Materials Again**—Orrin B. Werntz, executive secretary of the industry's trade association, says the industry wants defense contracts to assure itself of materials. It's a relatively small consumer of steel, brass and aluminum, the three most important metals it uses, and few individual companies can swing a great deal of weight with suppliers. In 1947, a year that is comparable to 1950 in physical production, it consumed more than 157,000 tons of carbon bars and bar shapes, 17,000 tons of alloy (other than stainless) bars and shapes and 1300 tons of stainless. It used more than 34,000 tons of brass and 1800 tons of aluminum. The current high production pace is threatened by shortages in all three of those metals.

Manpower is another serious problem, points out Mr. Werntz. So scarce is skilled labor that many companies are working two shifts ten hours a day. The average production employee is working 51 hours per week. The tightest pinch is in the Chicago area.

**Another Problem**—A third problem of the industry is shortage of equipment, although that is not nearly as serious as the other two. Its fixed assets-to-sales ratio is one of the highest in the U. S. That means companies are putting their money back into their plants.

For 16 consecutive months now companies producing screw machine items have received more new orders than they have made shipments. Only once before in history has that happened—and then the U. S. got into World War II. The order backlog in March was 17 weeks. Many companies in the industry are now offering 26-week deliveries or longer. That is a 150 per cent increase over a year ago. The earnings picture in 1951 is fairly good in an industry which, as a whole, can experience extreme fluctuations from year to year.

**Gay Nineties**—The trade had its origins in the 1890s when the first screw machines were invented. Its industry status started in World War I. The first big growth came from 1918 to 1925. By 1926 it had shaken itself of the marginal units to such an extent that less than 200 companies were making screw machine products.

The second great period of growth was from 1939 to 1947. New companies formed in that time are coming to the fore now, in one field where the little company still flourishes—if it can sell, engineer and tinker.

Wide World

CHERRY PICKERS: Navy Seabees find equipment they are using much the same as that they operated in civilian life. Here they learn how to use a cherry-picker crane—a Trackson swing crane mounted on an International T-9 tractor. Cherry pickers pick just about everything but cherries

## National Malleable Expands

To help meet the needs of the national defense program, National Malleable & Steel Castings Co., Cleveland, is beginning a $6.3 million expansion program.

This will raise the company's capacity about 25 per cent, the large part of the increase being in facilities for malleable iron production.

All of the company's plants at Cleveland, Chicago, Indianapolis, Sharon, Pa., and Melrose Park, Ill., will share in the improvements. Largest expenditures are planned for the Cleveland works, where an entire new malleable foundry unit, from melting furnaces to finishing equipment, will be added.

Some of the new equipment will be in operation by mid-1951 and all of the improvements should be completed by a year from now, says Cleve H. Pomeroy, president.

Included in the overall program are electric melting furnaces, cupolas, air furnaces, electric annealing furnaces, electric heat-treating furnaces, molding machines, sand-handling equipment, conveyors, cleaning and finishing equipment, hydraulic presses, dust-arresting equipment and equipment for x-raying castings.

## More Room for Ryan

More than $2 million worth of new production machinery and other equipment, exclusive of special tooling and fixtures will be installed in a plant addition of Ryan Aeronautical Co., San Diego, Calif.

The addition, on which construction began last week, is adjacent to the company's large final and subassembly building on Lindbergh Field. Costing $300,000, the addition will provide space needed for expansion of Ryan's jet engine components manufacturing program. The addition will house additional precision machining equipment, heavy presses, extensive welding equipment, annealing ovens and other facilities for stainless steel fabrication.

## Modern Touch for Casey Jones

One way to speed the handling of materials is to get the most out of the equipment you have, reasoned Kaiser Steel Corp. So, it equipped some of its yard locomotives at its Fontana, Calif., plant with two-way radio telephones to permit the dispatcher to be constantly in touch with the engineers on the 46 miles of track in the plant area.

## Ore Headaches Loom

**Europe must find more ore to make up for scrap deficit or it won't meet 1953 goal**

EUROPEAN countries (not counting Russia) face an iron ore shortage of between 5 million and 10 million tons by 1953.

The Iron Ore Working Group of the United Nations Economic Commission for Europe estimates that all European nations but Russia will fall 5 to 10 per cent short of their 1953 pig iron production goal—64.9 million tons—if more ore is not forthcoming.

**Because of Scrap**—The ore deficit is as high as it is because of scrap. Scrap-ratio charges in blast furnaces since the war have been double that of the prewar period because so much scrap has been available. Scrap is rapidly tightening in supply and scrap ratios near the prewar levels are likely by 1953. That will boost the need for ore. The other major raw material needed for pig iron—coke—is also more difficult to get, but Europeans believe they will be able to squeeze by in that commodity.

Methods of solving the ore shortage have not yet been fully worked out. Under present estimates, the deficit concerns principally low phosphorus grades. It may be possible and necessary, in meeting certain of the requirements for those grades, to substitute high phosphorus grades that will probably be more easily obtainable.

**They Have Their Methods** — The shortage will also be relieved by increased exploitation of low grade deposits in France and West Germany. The Germans expect to mine 13.2 million tons, with an iron content of 3.7 million tons in 1951. That production will be about 50 per cent more than in 1936. As a result of that increase, the share of domestic ores in Ruhr furnaces may amount to about 33 per cent, compared with less than 20 per cent in 1937. The main German iron ore district is at Salzgitter, the site of the Hermann Goering works. Seven countries—Austria, Belgium, France, Germany, Greece, Italy and the Netherlands—have agreed to share expenses on a project to determine the most economical use of low-grade ore. Two new blast furnaces will be built at Leige, Belgium, and Oberhausen, West Germany, to experiment with oxygen blast, powdery ores and ores with high sulphur content.

Another help in relieving the ore shortage will be the steadily increasing production of high grade Swedish material. Sweden in 1950 exported 15.4 million tons, a record volume made possible by modernization programs. But there's one problem with Swedish ores: Prices have risen 15 per cent in a little more than a year.

**Production Threat** — The prospective ore and pig iron shortage may jeopardize Western Europe's production pace which has improved 11 per cent a year for the past two years. From figures thus far available, November, 1950, saw the postwar industrial production peak when the index climbed to 141. The figure is computed on the basis of an index of 100 for 1938. The average index for the third year of the Marshall Plan is estimated at 130, which represents a gain of 13 points or 11 per cent, over the 117 index achieved in the second year of the Marshall Plan. The index for the first year was 105. Production gains were paced by metalworking products. Steel ingots and castings output jumped 19 per cent from April, 1950, to October. Pig iron and ferroalloy production soared 22 per cent. Commercial vehicle assemblies jumped 23 per cent.

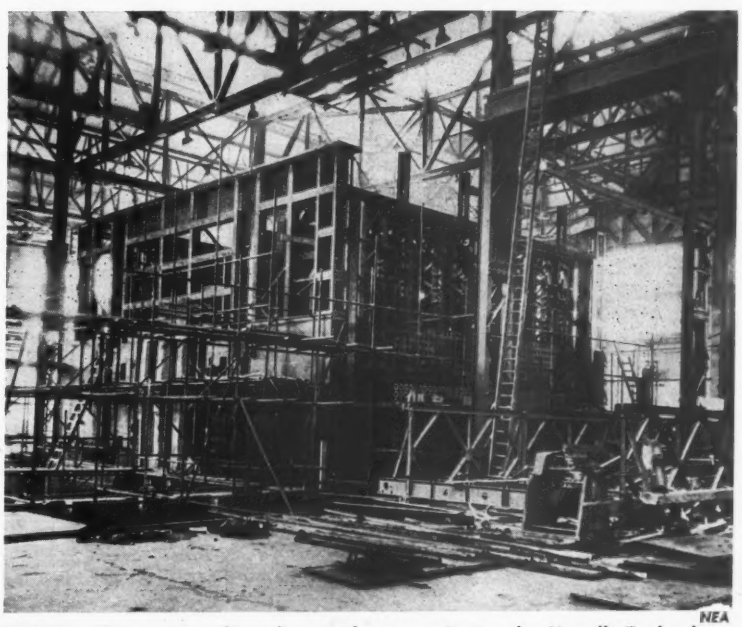
The industrial production indexes for individual Marshall Plan countries also reached peaks last fall before declining in December in the traditional seasonal holiday drop. Austria's peak index was 154 in November. Belgium's rose to 135 in the same top month. Denmark's official index climbed to 162 in November. West Germany's index jumped to 114 in November; 1950 was the first postwar year in which the nation has surpassed prewar levels. The United Kingdom's index held at 160 in both October and November. Peak third-year Marshall Plan figures in other countries include Greece's index of 132 in October and November; the Netherlands' 154 in October; and Norway's 151 in May. Preliminary figures for early 1951 are only now being compiled, but they indicate that 1951 levels will be even higher than for the record October and November indexes in 1950. France's index rose to a high of 140 in January, compared with 137 in November, the previous peak. Italy's January industrial performance matched the October, 1950, high of 131.

## Hungarian Steel Plant Reported

An integrated steelworks is reportedly being built on the Danube, about 40 miles from Budapest in Hungary. The annual capacity of the plant may be about 550,000 net tons of ingots.

## Mexico To Get New Coke Plant

Mexico will buy a new coke plant in Germany and bring German technicians to Monclova, where the plant will be built, to train Mexican workmen. The Mexican finance agency said a $5 million order has already been given to a German firm.

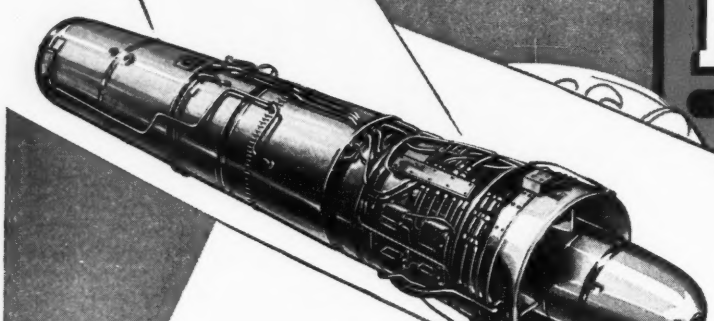


NEA

**PILE-UP:** This atomic pile under rapid construction at the Hartell, England research establishment is Britain's entry in the worldwide atomic energy race. This view is of experimental and unloading faces. The pile is nearly completed

Another First for...

N-A-X
ALLOY STEELS



*The use of N-A-X ALLOY STEEL in Aircraft Gas Turbines saves up to 50 per cent of critical Stainless Steel.*

**Conservation is possible – without sacrifice with use of N-A-X ALLOY STEELS**

With the demand for greatly increased quantities of the critical and strategic Stainless Steels used in Jet Engines intensified by the acceleration of the building program, the Air Force requested the producers of these **engines** to seek *suitable* material with less critical alloy content to replace the Stainless Steel for certain moderate temperature application in these aircraft gas turbines.

The steel selected had to be of low-alloy content with high strength and good welding characteristics. Ordinary low carbon steel did not meet the requirements because of its low tensile properties and the fact that it could not be satisfactorily welded by the inert arc process, which is widely used in aircraft gas turbine manufacture.

The data available from tests made on several weldable low-alloy, high-strength steels indicated that N-A-X ALLOY STEEL was the most satisfactory of the group — *its selection followed.* Unlike other possible substitutes, N-A-X ALLOY STEEL has good low temperature impact values, maintains its higher strength and is not subject to temper brittleness in the wide operating temperature range required of the steel for this purpose — from a low of −70°F. to +800°F.

The use of N-A-X ALLOY STEEL for this application has cut the amount of Stainless Steel required in half. This is of considerable importance to the Air Force.

**GREAT LAKES STEEL CORPORATION**

N-A-X Alloy Division — Ecorse, Detroit 29, Michigan

NATIONAL STEEL CORPORATION

By H. C. TUTTLE *Detroit Editor*

# Mirrors of Motordom

## Kaiser-Frazer shows conversion know-how as it moves to devote part of Willow Run's floor space to production of the Fairchild Packet

*DETROIT*

BRIEFNESS of Kaiser-Frazer's shutdown—it began last Monday and will end next Monday—tends to make the conversion job at the vast Willow Run plant look easy. Fact is that it is just short of a miracle how little time is being lost in arranging the facility to produce automobiles and airplanes side by side.

**Conversion Know-How** — K-F's chore is becoming more commonplace in the metalworking industries, but for most companies the problems are not so complex. One of the things making K-F's conversion unique is the size of the product to be manufactured. The Fairchild C-119 Packet is the nation's largest twin-engine military transport. It has a length of over 85 feet, a wingspan of 109 feet. Now seeing extensive service in Korea, the plane is capable of carrying a 105-mm howitzer and its 22-ton prime mover, or three jeeps and 22 men, or 42 combat-equipped paratroopers, to name a few of its loads. It is the largest plane scheduled for building by an automobile producer. Willow Run is the largest plant in use for automobile production.

Operated during World War II by Ford Motor Co., the 80-acre main manufacturing building was the spawning ground for 8685 B-24 Liberator bombers. In it Ford introduced progressive assembly lines to aircraft manufacture.

**One Third for Defense**—About 35 per cent of the space, or more than a million square feet, in this huge plant will be devoted to the C-119 program. While neither the Air Force nor K-F will discuss the quantity of Packets which the plant is being tooled up to produce, it is no secret that the facility will be capable of turning out several complete planes a day.

In many respects it would have been easier for K-F to tear out all its automobile production equipment and start from scratch to reconvert the plant to aircraft building. Not long ago, however, President Edgar F. Kaiser announced that cars would be the company's primary interest as long as it could produce them.

**Make Way for Planes**—To clear the aircraft area has involved the removal or relocation of eight 50-foot paint spray booths, eight 200-foot paint ovens, nine floor conveyors totaling 7080 feet, two 850 x 39-foot concrete loading docks, 6200 feet of floor track, two 120-foot carrousel conveyors and two automotive trim lines totaling 3800 feet.

In place of this equipment, in an "L" shaped bay to contain two parallel assembly lines and measuring 2300 feet in overall length by 840 feet at the widest point, will go the machinery, jigs and fixtures and storage areas for plane production. K-F people refer to a barrier which will separate the two operations of the plant as the "iron curtain."

**In Millions**—On the aircraft side, the machinery installations to date have a value of $8 million. By the end of this month it is expected that 1200 pieces of machinery, most of which have been in storage at Marietta, Ga., and Omaha, will be in place. About 800 workers are involved in this preproduction work. Only two months is to be consumed by the conversion.

Credit for much of the rapidity with which the changeover is being made goes to Harvey Smith's production planning department, which is making use of a new device to cut down engineering and blueprint-drawing time. With conventional techniques six months of work by about 160 draftsmen would be required to lay out the plant changes. Using three-dimensional models and a trick method of blueprint production, only 60 men are needed. Time saved, K-F engineers say, is "incalculable."

**Duplication**—The Willow Run plant is duplicated using quarter-inch to the foot grid sheets which underlay glass plates. After placing scale models of the machinery and materials handling equipment on these plates and locating them exactly as to production requirements, flat templates which duplicate the dimensions of the models are then substituted, being fastened to the glass with an adhesive developed by Minnesota Mining & Mfg. Co. specifically for this purpose. Templates representing columns, stairways and the like are also attached. The transparent grid sheets are then removed from under the glass and placed on top of the templates, in which position they are then photographed and reproduced as blueprints, the actual making of a blueprint taking only ten minutes.

Although Willow Run, at the quarter-inch-to-the-foot scale, requires a model 70 x 35 feet, the physical problem of size has been overcome by

CONVERSION AT WILLOW RUN

*. . . iron curtain separates car seats from aircraft tools*

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chopping the grid sheets and glass plates into 2 x 3-foot sections and resting these on 44 six-foot square mobile tables so that any part of the plant model can be worked on.

**Troubles Still**—Although that innovation has simplified some phases of the conversion, it has not eliminated all snafus. For example, deliveries of airplane tires have already been made and quantities of aluminum sheet are waiting to be chewed up by machinery that has not yet been delivered. In test runs of the tools, some are found to contain stripped gears and all need replacement of oil seals and other parts which were allowed to deteriorate while in storage.

Getting jigs and fixtures for the aircraft will probably be K-F's biggest headache. Since the Packet was not a production plane in World War II there is no pile of those to draw upon, and Fairchild's own expansion is taxing its suppliers' capacity. Engines may also be a bottleneck, and manpower will be somewhat of a problem although a large percentage of K-F's present work force has had aircraft experience and its personnel people believe many experienced women can be lured back. In spite of stumbling blocks, however, the company is confident it will be building Packets by September or October.

## Patton Tank "Outstanding"

Performance details of the M-46 "General Patton" tank in combat were revealed to a near-capacity crowd of automotive engineers last week in Detroit by Maj. W. O. Miller Jr. of the Army Ordnance Corps. Major Miller, as project engineer on the tank at Aberdeen proving ground and as special observer for the chief of ordnance during tests at Fort Hood, Tex., closely followed its original development, and has just returned from Korea where he watched it get its baptism under fire.

Labeling our vehicles' performance in the field as "outstanding," he attributed the Allies' successes and ability to withstand overwhelming manpower superiority to firepower and mobility. His endorsement of the equipment, however, was not without qualification, and improvements would be desirable. Referring to general purpose vehicles such as trucks, he suggested that more rugged springing and shock absorber construction would better suit these for primitive road conditions.

Comparing the M-46, the only postwar tank which is in use, with the much publicized Russian T-34, he granted that each had its good points. For one thing, he said, the enemy has stopped using armor piercing ammunition because of its ineffectiveness against the M-46. The M-46 is considerably faster than the T-34. The Russian-made tank is capable of going 30-35 miles per hour, while the Patton can go in excess of 35 miles per hour "and not just a mile or two faster," he declared. The Patton's air-cooled V-12 gasoline engine develops 810 horsepower, compared with 500 horsepower for the V-12 water-cooled diesel which powers the Russian tank. Our tank weighs 48 tons compared with 36 for the T-34. Our tankers have better protection, and driver training is much easier because of the automatic transmission which is in the M-46. Air cooling reduces the supply problem and the gasoline engine probably gives better starting in cold weather.

On the debit side, however, are the facts that the T-34 has a cruising range more than twice as great as the M-46's 70-plus miles, its steel tracks can be replaced more readily, its lower fuel consumption reduces the fuel supply problem. The M-46 gets only a third of a mile to the gallon. The T-34, while rather crudely constructed, is reduced to essentials.

Some of the improvements being worked on for the M-46 are means for lightening the suspension, replacement of the "wobble stick" with a steering wheel and elimination of some of the instruments.

## Auto, Truck Output

U. S. and Canada

| | 1951 | 1950 |
|---|---|---|
| January | 645,688 | 609,878 |
| February | 658,918 | 505,593 |
| March | 802,737 | 610,680 |
| April | 684,144 | 585,705 |
| May | | 732,161 |
| June | | 897,853 |
| July | | 746,801 |
| August | | 842,335 |
| September | | 760,847 |
| October | | 796,010 |
| November | | 633,874 |
| December | | 671,622 |

Weekly Estimates

| Week Ended | 1951 | 1950 |
|---|---|---|
| Apr. 14 | 162,839 | 147,240 |
| Apr. 21 | 166,502 | 151,613 |
| Apr. 28 | 162,740 | 148,274 |
| May 5 | 155,930 | 146,337 |
| May 12 | 160,000* | 174,480 |

*Estimates by Ward's Automotive Reports*

*Preliminary estimate by STEEL.

## GMC To Build Tank Truck

Other defense news in the automotive industry includes the award of contracts totaling nearly $3.5 million to GMC Truck & Coach for 851 tank trucks. The tanks will be built by Butler Mfg. Co., Kansas City, Mo.; 115 are 2½-ton 900-gallon aluminum water tank trucks. The chassis is a standard GMC commercial model. (For other automotive defense contracts, see p. 56.)

## NPA Toys with Unit Curbs

NPA continues to toy with the idea of setting unit limitations on car producers and has served notice that steel use is to be cut 5 per cent in June and another 5 per cent in July. Most automakers are now constrained to limit steel use to 80 per cent of average quarterly consumption during first half of last year.

In July NPA wants car production down to 70 per cent of the 1950 rate. The industry would rather work without the hobbles of unit restriction so it can use its ingenuity to stretch supplies. NPA warns it wants no switch by makers to higher priced lines.

Light truck production also will get the 30 per cent ax, but mediums are to be turned out at 100 per cent of base, and heavies have been granted a go-ahead for 120 per cent of the first half 1950 output.

## Battery Makers Seek Help

A three-point program to smooth operations of dry cell battery manufacturers under the part defense and part peace economy was presented to the National Production Authority by a task force of the Dry Cell Battery Manufacturers Industry Advisory Committee.

The committee fears that battery producers may not be able to maintain a sufficiently high production rate to provide batteries for possible military emergency. Military cutbacks in orders for dry cell batteries, combined with restrictions on the quantity of zinc which may be used for civilian production, is resulting in some shutdowns and labor layoffs, battery manufacturers reported.

To aid the battery manufacturers, the task force recommends: 1. No limitation order be imposed upon the industry since it is maintaining equitable distribution of dry cells; 2. NPA should permit the industry to use whatever amounts of raw materials are necessary to maintain production of batteries for civilian use so that the industry will be ready to take care of military requirements as they develop; and 3. NPA should obtain information from the industry on the minimum production rate necessary for defense preparedness.

# Greater Productivity

## ...More Horsepower...Less Man Power

TODAY American Industry is under pressure to meet fantastic demands. Only yesterday, intense competition was the problem. Manufacturers have found the answer to both situations in more productive machine tools. The New Britain-Gridley Division, The New Britain Machine Company, New Britain, Conn., U.S.A.

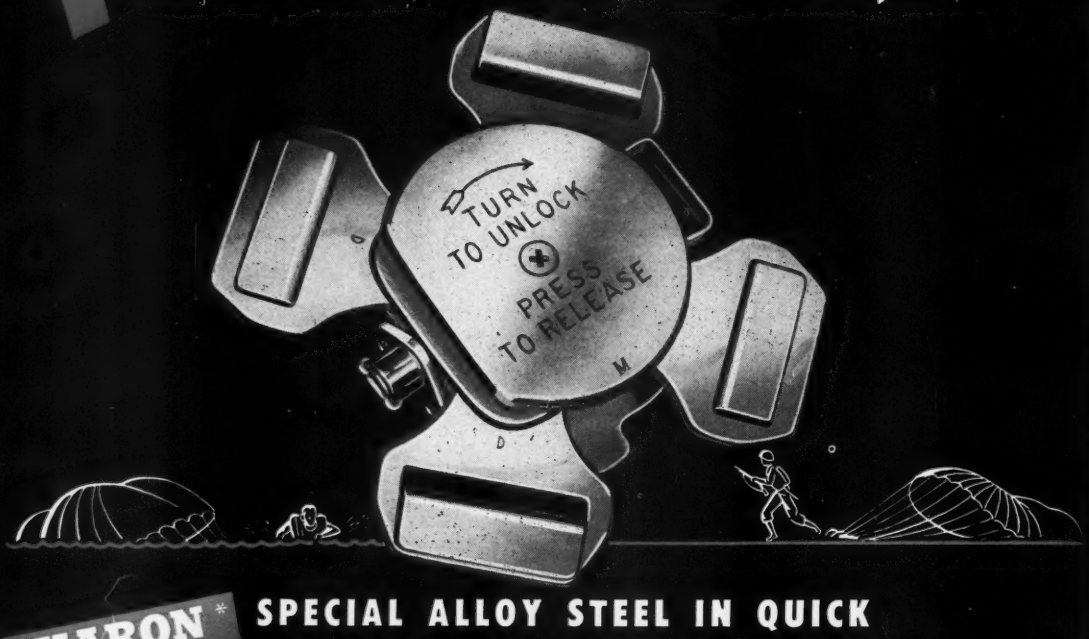
**AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES**

**LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES**

**NEW BRITAIN**

*Automatics*

# Pushbutton for the Paratroops...




## SHARON* SPECIAL ALLOY STEEL IN QUICK RELEASE PARACHUTE HARNESS

A paratrooper's life may depend on the speed with which he escapes his parachute harness to fight.

A pilot bailing out over the water must release himself from his chute before he drowns. A large push button quickly releases harness sections. Just a twist and a push and the harness falls free.

A man's life hangs on the steel lugs used in this type harness.

The Air Corps needs a steel that has a high strength-weight ratio.

When the release was first developed, a leading manufacturer called in his Sharon representative, who worked with him in producing a special steel that met all requirements. Once again there is an urgent need for parachutes and again Sharon Steel is a leading supplier of this specially developed parachute steel.

* Specialists in **STAINLESS, ALLOY, COLD ROLLED and COATED Strip Steels.**

**SHARON STEEL CORPORATION**
*Sharon, Pennsylvania*

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SHARONSTEEL

# The Business Trend

**Steel mills buttress the boom. Their terrific pace helps keep the industrial production index on a high plateau for the 12th consecutive week**

VIGOROUS INDUSTRIAL activity and a steady outpouring of goods into civilian and military markets continue. Leveling off at a point slightly under the postwar peak of 225, STEEL's industrial production index for the week ended May 5 stands at 217 per cent of the 1936-1939 average. This latest figure marks the 12th straight week the index has remained on the production plateau above 215. The previous week's adjusted total was 219; a year ago the index stood at 198. The latest reading is high despite a drop in automobile assemblies, the slack being taken up by record steel turnout.

## Painless Dislocations . . .

Pulling of punches on military buying so as not to stagger the civilian economy is promised by the Munitions Board. Procurement rules will be revised by the Pentagon so military orders will have the least possible effect on civilian supplies of goods and demands for production facilities. The guide will require a close check of inventories by the services and stresses substitution of plentiful items for scarce ones. Itemized schedules will be worked out for hard goods. Orders for soft goods will be based on buying patterns laid down over many months so that no big demands will be made on producers at one time.

## Dip in Auto Output . . .

Off nearly 7000 assemblies from the prior week's totals, output of automobile plants in the U. S. and Canada was scheduled at 155,930 cars and trucks in the week ended May 5, says *Ward's Automotive Reports*. The week before, 162,740 units were turned out. Comparative week in 1950 yielded 146,337. With an extra work day in the month, U. S. auto assemblies for May will range near 530,000 cars and 140,000 trucks, says *Ward's*. This estimate compares with a final count for April of 508,252 autos and 134,763 trucks. In the first four months of this year, U. S. and Canadian automakers turned out 2,795,590 units, well over 1950's total of 2,320,429.

## Steel: A Pacemaker . . .

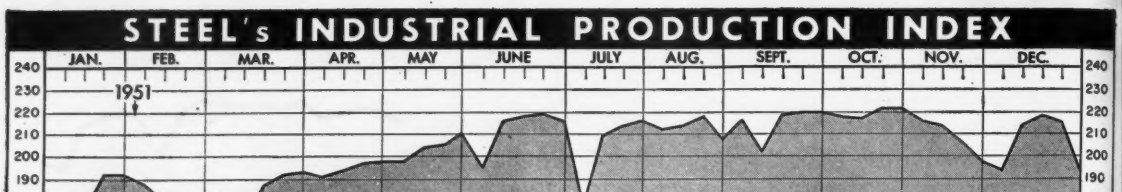
After breaking all tonnage records in the week ended May 5, the steel industry was scheduled to take a slight production dip in the week ended May 12. Output was figured at 2,073,000 net tons of ingots and steel for castings, compared with 2,079,000 in the previous week and 1,908,200 tons a year ago. The spectacular marks hung up in steel output are a prime reason for the high levels of the production index.

## Plants Top Building Awards . . .

Adding fuel to the 1951 production fire is industrial construction. In the week ended May 3, industrial building contracts led the engineering construction awards with a volume of $80 million, *Engineering News-Record* reports. This marked the 12th week this year it has topped other classes of construction. For the year to date, volume of industrial building contracts awarded is 405 per cent

## BAROMETERS of BUSINESS

| | | LATEST PERIOD* | PRIOR WEEK | MONTH AGO | YEAR AGO |
|---|---|---|---|---|---|
| INDUSTRY | Steel Ingot Output (per cent of capacity)† | 104.0 | 103.5 | 103.0 | 100.5 |
| | Electric Power Distributed (million kilowatt hours) | 6,560 | 6,674 | 6,736 | 5,872 |
| | Bituminous Coal Production (daily av.—1000 tons) | 1,735 | 1,761 | 1,689 | 1,470 |
| | Petroleum Production (daily av.—1000 bbl) | 6,174 | 6,154 | 6,127 | 5,058 |
| | Construction Volume (ENR—Unit $1,000,000) | $270.6 | $284.7 | $236.8 | $250.6 |
| | Automobile and Truck Output (Ward's—number units) | 155,930 | 162,740 | 158,076 | 146,337 |
| | *Dates on request. †Weekly capacities, net tons: 1951, 1,999,035; 1st half 1950, 1,906,268; 2nd half 1950, 1,928,721. | | | | |
| TRADE | Freight Car Loadings (unit—1000 cars) | 810† | 825 | 740 | 774 |
| | Business Failures (Dun & Bradstreet, number) | 163 | 162 | 195 | 199 |
| | Currency in Circulation (in millions of dollars)‡ | $27,255 | $27,122 | $27,138 | $27,051 |
| | Department Store Sales (changes from like wk. a yr. ago)‡ | +3% | +1% | −14% | −1% |
| | †Preliminary. ‡Federal Reserve Board. | | | | |
| FINANCE | Bank Clearings (Dun & Bradstreet—millions) | $17,064 | $16,103 | $17,603 | $14,599 |
| | Federal Gross Debt (billions) | $254.7 | $254.7 | $255.0 | $255.7 |
| | Bond Volume, NYSE (millions) | $16.7 | $17.2 | $15.7 | $18.8 |
| | Stocks Sales, NYSE (thousands of shares) | 10,147 | 8,782 | 7,482 | 11,613 |
| | Loans and Investments (billions)† | $69.9 | $69.8 | $70.2 | $66.5 |
| | United States Gov't Obligations Held (millions)† | $30,805 | $30,750 | $30,886 | $35,922 |
| | †Member banks, Federal Reserve System. | | | | |
| PRICES | STEEL's Weighted Finished Steel Price Index†† | 171.92 | 171.92 | 171.92 | 156.13 |
| | STEEL's Nonferrous Metal Price Index‡ | 243.0 | 243.0 | 246.7 | 165.7 |
| | All Commodities† | 183.4 | 183.6 | 183.3 | 154.7 |
| | Metals and Metal Products† | 189.6 | 189.6 | 189.8 | 169.1 |
| | †Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100. | | | | |


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1951
1950
Latest Week* 217
Previous Week 219
Month Ago 216
Year Ago 198
Two Years Ago 182
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
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*Week ended May 5

above the comparable period of 1950.

Put in place during the first four months of this year was nearly $8½ billion in new building valuation. This is a 20 per cent increase over the corresponding period of 1950. Industrial buildings erected in the January-April period had a total value of $556 million, exactly double that of a year ago.

## Retreat on Price Front . . .

A welcome word from the Bureau of Labor Statistics: Wholesale prices slid back a fraction during the week ended May 1. The bureau's all-commodity index stood at 183.4 per cent of the 1926 average. The latest figure is 18.6 per cent above a year ago and 16.9 per cent more than it was in the month just before Korea.

## More Coal Above Ground . . .

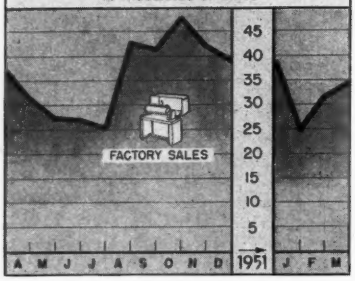
Reserves of bituminous coal and lignite on hand are reaching a more comfortable level. They increased from 48 days on Mar. 1 to 53 days on Apr. 1. Stocks were set at 71,411,000 net tons on Apr. 1, compared with 70,662,000 tons a month before.

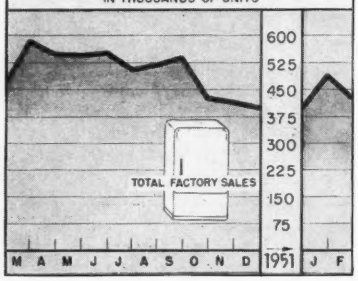
Weekly production estimates from the National Coal Association show bituminous coal production during the week ended Apr. 28 to be about 10,410,000 net tons. In the previous week, 10,565,000 tons were mined.

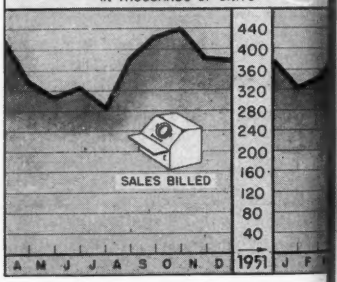
## Freight Car Output Tops 8000...

Results of the government's steel allocation program designed to boost rail transportation facilities are evident in April figures for freight car deliveries: 8274 cars. This was an 18 per cent jump over March's 7011, and 41 per cent above February.

Orders for more cars continued to pour into the shops of carbuilders during April. Placed in that month were orders totaling 6228 cars, bringing the backlog of cars on order to 155,871. Carbuilders turned out 5781




**Standard-Size Ironers**
Factory Sales—Units

| | 1951 | 1950 | 1949 |
|---|---|---|---|
| Jan. | 24,600 | 20,300 | 28,300 |
| Feb. | 32,400 | 27,600 | 28,400 |
| Mar. | 34,700 | 37,800 | 23,800 |
| Apr. | ..... | 31,600 | 18,100 |
| May | ..... | 27,400 | 19,500 |
| June | ..... | 27,100 | 21,100 |
| July | ..... | 25,100 | 17,700 |
| Aug. | ..... | 42,700 | 32,300 |
| Sept. | ..... | 41,400 | 27,700 |
| Oct. | ..... | 47,500 | 36,045 |
| Nov. | ..... | 41,900 | 35,000 |
| Dec. | ..... | 38,800 | 19,400 |
| Total | ..... | 409,200 | 307,345 |

American Home Laundry Mfrs. Assoc.

**Electric Refrigerators**
Total Factory Sales—Units

| | 1951 | 1950 | 1949 |
|---|---|---|---|
| Jan. | 488,607 | 375,856 | 396,329 |
| Feb. | 423,420 | 461,256 | 348,539 |
| Mar. | ..... | 586,293 | 382,861 |
| Apr. | ..... | 546,279 | 335,092 |
| May | ..... | 542,865 | 341,933 |
| June | ..... | 549,740 | 310,780 |
| July | ..... | 507,029 | 327,429 |
| Aug. | ..... | 518,359 | 314,839 |
| Sept. | ..... | 535,002 | 326,149 |
| Oct. | ..... | 420,431 | 265,575 |
| Nov. | ..... | 411,201 | 230,258 |
| Dec. | ..... | 394,268 | 272,636 |
| Total | ..... | 5,848,579 | 3,852,420 |

National Electrical Mfrs. Assoc.

**Household Washers**
Sales Billed—Units

| | 1951 | 1950 | 1949 |
|---|---|---|---|
| Jan. | 321,092 | 275,576 | 172,400 |
| Feb. | 341,328 | 342,967 | 201,300 |
| Mar. | 368,455 | 423,802 | 242,500 |
| Apr. | ..... | 333,072 | 192,500 |
| May | ..... | 304,640 | 211,700 |
| June | ..... | 325,217 | 260,700 |
| July | ..... | 282,261 | 200,900 |
| Aug. | ..... | 381,452 | 323,789 |
| Sept. | ..... | 424,043 | 357,281 |
| Oct. | ..... | 439,924 | 333,728 |
| Nov. | ..... | 379,964 | 298,717 |
| Dec. | ..... | 377,013 | 237,591 |
| Totals | ..... | 4,289,931 | 3,033,106 |

American Home Laundry Mfrs. Assoc.

Charts—Copyright 1951, STEEL

of the April total, and the balance was delivered from private railroad shops. Only 1776 of the new units ordered during April went to commercial builders.

## Inventories at Record High . . .

With panic buying subsiding somewhat, manufacturers' inventories have swelled. Total business inventories at the end of March were estimated at $67.2 billion by the Office of Business Economics. The book value, after allowance for seasonal variations, is $1.7 billion above February. About 60 per cent of this book value rise represents increased prices.

## Padding the Payroll . . .

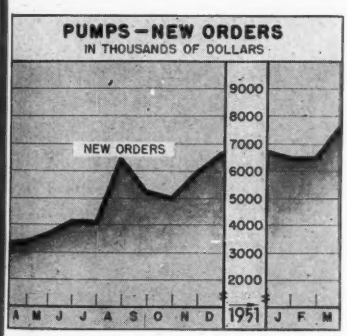
Hiring of factory employees continued in March at rates of the preceding months of this year, according to preliminary estimates by the Bureau of Labor Statistics. Layoffs, unchanged from February at 8 per 1000 workers, were at the lowest rate for the month since World War II. But the number of persons quitting factory jobs swelled between February and March. Workers were added to payrolls at a rate of 47 per 1000 employees in March. Stepped-up hiring in most of the metalworking industry was evident. Quitting in March were 26 employees per 1000, as against only 21 in February.

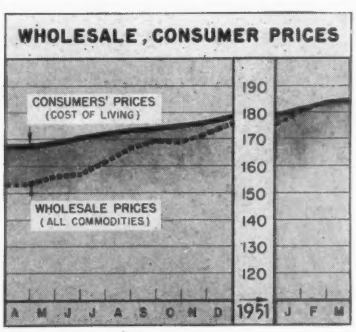
## Trends Fore and Aft . . .

New business incorporations expanded seasonally during March to 7649, a 16 per cent rise from February's relatively low number of 6590, but nearly 17 per cent below March, 1950. First quarter incorporations totaled 22,754, second lowest since the war. . . .Consumer credit outstanding amounted to $12,980 million at the end of March; installment credit outstanding and charge accounts outstanding both suffered reductions. . . Crosley division of Avco Mfg. Corp. cut back production because of materials limitation orders. . . American manufacturers turned out 4,235,597 radios and 2,199,699 television sets in the first quarter.

**Issue Dates of Other FACTS and FIGURES Published by STEEL:**

| | | |
|---|---|---|
| Construction .....Apr.30 | Furnaces, W. Air...Apr.9 | Ranges, Elec. .....May7 |
| Durable Goods .....May7 | Gear Sales .....May7 | Ranges, Gas .....Apr.30 |
| Employ., Metalwkg..Apr.2 | Gray Iron Castings.Mar.5 | Steel Castings .....Feb.26 |
| Employ., Steel .....Apr.9 | Indus. Production...Apr.16 | Steel Forgings .....Apr.30 |
| Fab. Struc. Steel....May7 | Machine Tools.....May7 | Steel Shipments ...Apr.23 |
| Foundry Equip. ....Apr.23 | Malleable Cast. ....Mar.12 | Vacuum Cleaners ..Apr.30 |
| Freight Cars .....Apr.23 | Purchasing Power ..Apr.23 | Wages, Metalwkg. .Apr.16 |
| Furnaces, Indus. ...Apr.16 | Radio, TV .....Apr.23 | Water Heaters .....Apr.30 |




**Pumps, New Orders**
In Thousands of Dollars

| | 1951 | 1950 | 1949 |
|---|---|---|---|
| Jan. ..... | 6,477 | 2,586 | 3,390 |
| Feb. ..... | 6,480 | 2,938 | 3,247 |
| Mar. ..... | 7,654 | 3,313 | 3,593 |
| Apr. ..... | .... | 3,376 | 2,699 |
| May ..... | .... | 3,668 | 2,775 |
| June ..... | .... | 4,153 | 3,019 |
| July ..... | .... | 4,080 | 3,358 |
| Aug. ..... | .... | 6,429 | 3,767 |
| Sept. ..... | .... | 5,191 | 2,914 |
| Oct. ..... | .... | 4,985 | 2,539 |
| Nov. ..... | .... | 5,961 | 2,525 |
| Dec. ..... | .... | 6,720 | 2,560 |
| Total ..... | .... | 53,400 | 36,386 |

Hydraulic Institute

**Price Indexes**

| | Wholesale (1926=100) | | Consumers (1935-39=100) | |
|---|---|---|---|---|
| | 1951 | 1950 | 1951 | 1950 |
| Jan. .. | 180.1 | 151.5 | 181.5 | 168.2 |
| Feb. .. | 183.6 | 152.7 | 183.8 | 167.9 |
| Mar. .. | 184.0 | 152.7 | 184.5 | 168.4 |
| Apr. .. | .... | 152.9 | .... | 168.5 |
| May .. | .... | 155.9 | .... | 169.3 |
| June .. | .... | 157.3 | .... | 170.2 |
| July .. | .... | 162.9 | .... | 172.0 |
| Aug. .. | .... | 166.4 | .... | 173.4 |
| Sept. . | .... | 169.5 | .... | 174.6 |
| Oct. .. | .... | 169.1 | .... | 175.6 |
| Nov. .. | .... | 171.7 | .... | 176.4 |
| Dec. .. | .... | 175.3 | .... | 178.8 |

U. S. Bureau of Labor Statistics


*A Note to the Owner of a Closely Held Company*

The Estate tax is one of several good reasons for a public market in the securities of your company. How much better to see the program through yourself, rather than to load that additional burden on the shoulders of your heirs and executors.

Our firm is well qualified to advise you in such matters, and to arrange the marketing of blocks of stock on proper terms. We would like to tell you how similar situations in which we have served have developed to the benefit of all concerned. A discussion with us incurs no obligation, and may lead to the solution of your particular problem.

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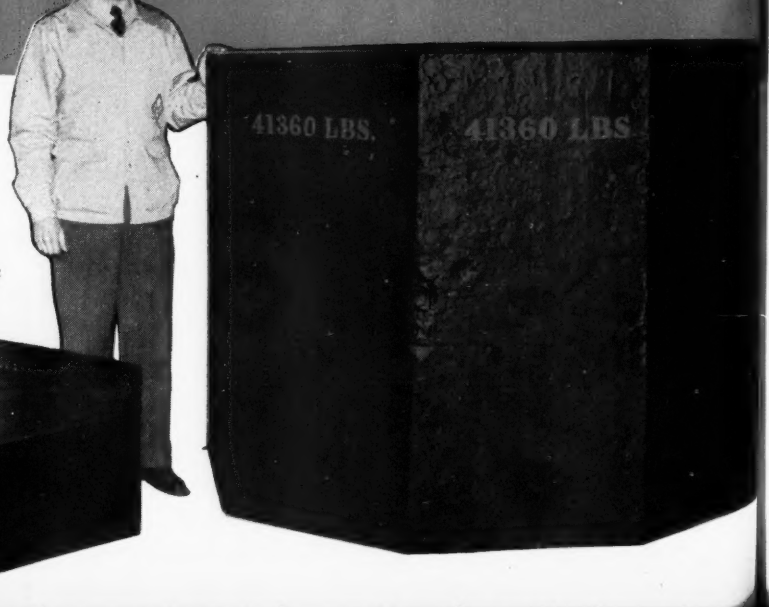
Experienced die block users know Heppenstall Hardtem . . . they know they can count on top quality, and get dependable blocks every time!

Made of Heppenstall's own special analysis steel, Hardtem Die Blocks are the result of the very highest degree of forging and heat treating skills. Regardless of size or shape, each block is quenched and tempered to the exact hardness required for a specific service application. Final supersonic tests make certain that every die block shipped is free from harmful defects.

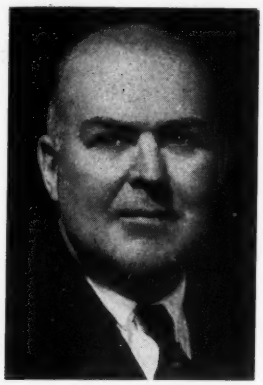
To be sure of *proved* quality, and to get more forgings per block—just call on Heppenstall! Heppenstall Company, Pittsburgh 1, Pa.
Sales offices in principal cities.




**Heppenstall**

*...the most dependable name in forgings*

# Men of Industry



CYRUS N. JOHNS
*. . . president, American Chain & Cable*

J. J. ROZNER
*. . . V. P.-operations, Aetna Ball*

ALONZO G. DECKER
*. . . Black & Decker president*

**Cyrus N. Johns** was elected president, **American Chain & Cable Co. Inc.**, Bridgeport, Conn. He succeeds **Wilmot F. Wheeler** who was elected board chairman and who continues as chief executive officer. **Walter B. Lashar,** former chairman, is retiring because of ill health. The new president, Mr. Johns, was general manager of the Page Steel & Wire Division at Monessen, Pa. He has been executive vice president since 1946 and a director since 1937.

**Detroit Steel Corp.,** Detroit, elected **H. E. Baughman** vice president in charge of its Portsmouth, O., operations, and **Duncan Baxter** as vice president in charge of industrial relations for the corporation's plants.

**Clayton E. Scholes** was appointed assistant to the president of **Osco Steel Co.,** Cleveland.

**William F. Clemons** was named sales engineer for **Udylite Corp.'s** Cincinnati territory.

**Walter Whiting** was appointed Chicago district manager, electrical wire division, **John A. Roebling's Sons** Co., Trenton, N. J.

**H. J. Krause,** until recently with Newaygo Engineering Co., was appointed eastern sales representative, **Beardsley & Piper Division,** Pettibone Mulliken Corp., Chicago, to succeed **Harold Lind.** For several years previous to association with Newaygo, Mr. Krause was with Beardsley & Piper in its engineering department. Mr. Lind was transferred and appointed district sales representative in the Midwest territory to succeed the late **R. L. Hannan.**

**J. J. Rozner,** formerly chief engineer and works manager, was elected vice president in charge of operations of **Aetna Ball & Roller Bearing Co.,** Chicago. In this newly created post he directs all manufacturing, engineering, inspection, quality control and development activities. **J. E. Dillon** succeeds Mr. Rozner as chief engineer, and the position of works manager has been dropped from the company's executive roster. **C. E. Poehler** was appointed assistant to the plant superintendent, **H. V. Fox.**

**Shenango-Penn Mold Co.,** Pittsburgh, elected **W. P. Snyder III** as president succeeding **Harry S. Bradley** who retires as active head of the company, but remains on the board of directors and will act in an advisory capacity. Mr. Snyder joined the company in 1938. He has been a vice president since 1946.

W. P. SNYDER III
*. . . president, Shenango-Penn*

**Alonzo G. Decker,** vice president and general manager of **Black & Decker Mfg. Co.,** Towson, Md., was elected president to succeed the late **S. Duncan Black.** Mr. Decker and Mr. Black formed the portable electric tool firm in 1910. **Robert D. Black** was advanced to vice president from vice president in charge of sales, and **Glen H. Treslar,** vice president and sales manager, assumes Mr. Black's former position.

**Alonzo B. Maines** was appointed employment and safety director, **Republic Rubber Division,** Lee Rubber & Tire Corp., Youngstown. He replaces **G. F. Hodgson,** retiring after 40 years of service with Republic. **Lloyd H. House** becomes production co-ordinator of the division.

**Charles J. Leonard** was made advertising manager, **Kaiser-Frazer Corp.,** Willow Run, Mich.

**E. R. Phillips,** formerly advertising manager, Pittsburgh Gear Co., has joined **Tom Brown Inc.,** Pittsburgh, as general manager of its industrial supply division.

**Allen Hurt** was appointed sales manager, Cleveland division, **Solar Steel Corp.** He formerly was an executive of Eastern Stainless Steel Co. Most recently he aided in establishing the Ohio & Commercial Steel Co., and has been its sales manager.

**Alan Cameron** was named manager of the newly created foundry division of **Rosan Inc.,** South Gate, Calif. During World War II he was a special representative of Firestone Aircraft Co., subsidiary of Firestone Tire

& Rubber Co. He has had many years of experience in the aircraft field.

**Ralph B. Knight** was appointed general manager, Rochester, N. Y., products division, **General Motors Corp.** He succeeds **Thomas L. Lee,** retiring May 31 after serving in that position since the division was organized in 1939. Mr. Knight became assistant general manager last June.

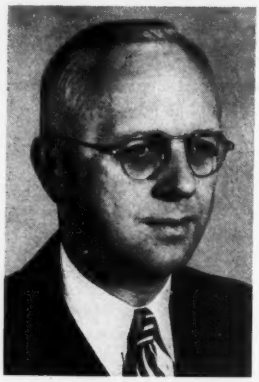
**Jones & Laughlin Steel Corp.,** Pittsburgh, appointed **W. P. Getty** assistant to the vice president of operations. **C. M. Lichy** succeeds Mr. Getty as assistant general manager of raw materials, and **C. E. Amos** was appointed assistant to general manager-raw materials. **Samuel C. Faddis** was named chief metallurgist at the Pittsburgh Works, and is succeeded as assistant chief metallurgist by **Simon Feigenbaum.**

**Theodore R. Colville,** advertising manager, pump division, **Byron Jackson Co.,** Los Angeles, was made manager of advertising and sales promotion.

**Shenango Furnace Co.,** Pittsburgh, elected **Claude J. Peck** to a vice presidency.

**Richard J. Brown** was appointed advertising and sales promotion manager, **Delta Power Tool Division,** Rockwell Mfg. Co., Milwaukee.

**Ephraim N. Osterberg,** associated with **Stewart-Warner Corp.,** Chicago, since 1916, was appointed director of purchases to succeed **Roy F. Stiles** who has reached the firm's retirement age but is remaining in a consultant capacity. Mr. Osterberg since 1942 has been purchasing agent of the company's Division One, the Alemite & Instrument Division, where he is replaced by **R. J. Gorzynski.**



P. R. HATCH
*. . . Brown & Sharpe V. P.*

W. B. BAINTON
*. . . Brown & Sharpe V. P.*

**P. R. Hatch** and **W. B. Bainton** were elected vice presidents of **Brown & Sharpe Mfg. Co.,** Providence, R. I. Mr. Hatch has been sales director and Mr. Bainton, works manager since 1947.

**Robert G. Leary** was elected vice president, and **Theodore G. Kenefick** a director of **Rigidized Metals Corp.,** Buffalo. Mr. Leary continues as general sales manager.

Promotions at **U. S. Steel Co.'s** Youngstown district include: **Edward E. McGinley,** chief metallurgist, made assistant division superintendent for steel production; **Edward N. Hibbert,** chief process metallurgist, named chief metallurgist; **William W. Myers** becomes superintendent of the fabricating shop to succeed **James W. Franz,** who goes to Edgar Thomson Works at Braddock, Pa., as superintendent of operating maintenance.

**American Machine & Foundry Co.,** New York, elected **Arnold K. Brown** executive vice president and director. He formerly was vice president and director of Brown & Sharpe Mfg. Co. **Daniel H. Haynes,** formerly AMF vice president and treasurer, was elected vice chairman of the board of directors and chairman of the executive committee. **David S. Meiklejohn** becomes treasurer.

**American Steel & Wire Co.,** Cleveland, subsidiary, U. S. Steel Corp., appointed **Roger W. Berrett** to the newly created position of senior assistant purchasing agent. **T. M. Haddock** was appointed assistant purchasing agent, and is succeeded as eastern district purchasing agent by **W. W. Oliver. Elmer R. Johnson** becomes assistant purchasing agent, eastern district.

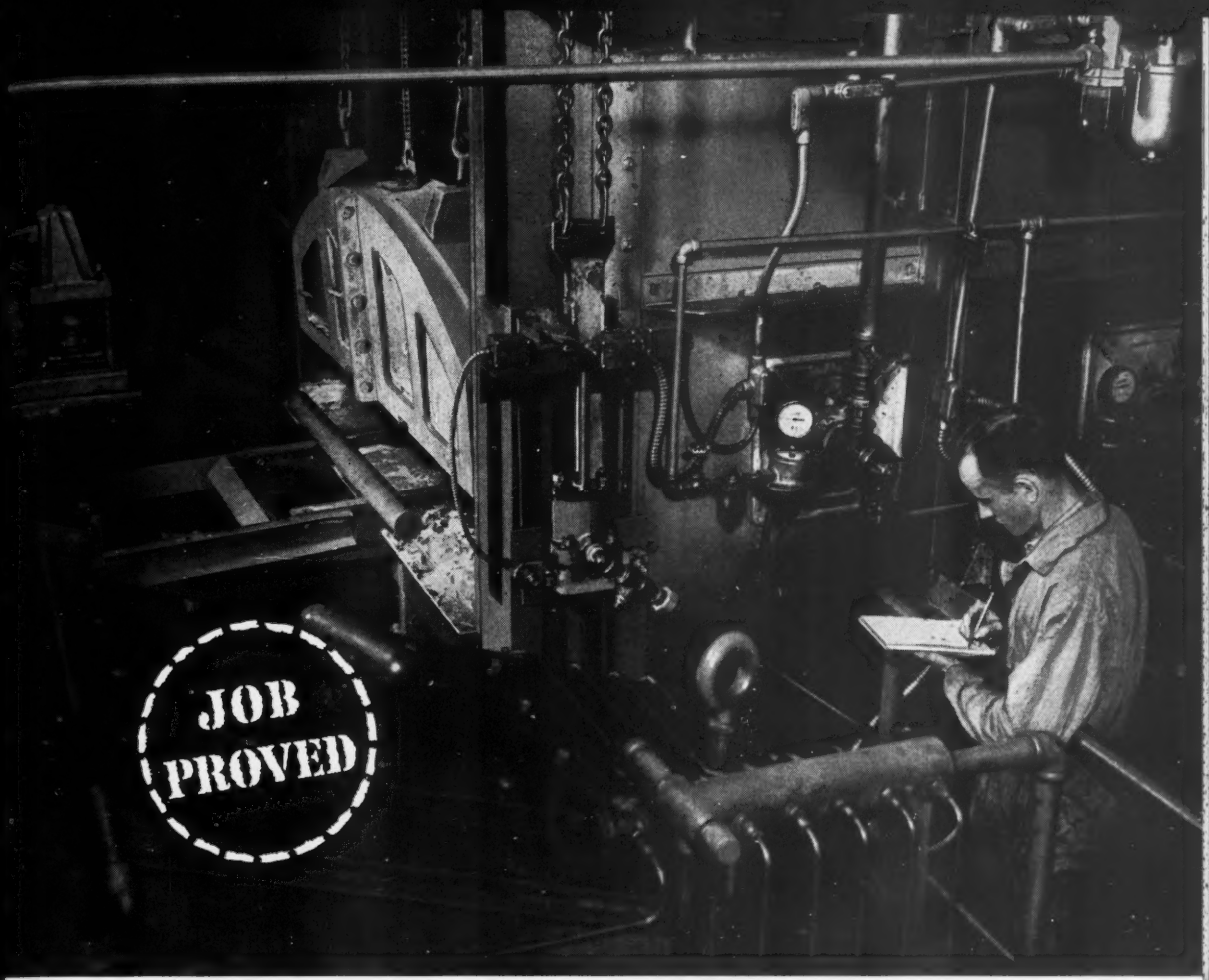
**Edwin B. McConville** was elected executive vice president of **Skilsaw Inc.,** Chicago. **Paul Watts** was elected vice president in charge of sales, and **Ralph B. Brundrett** as treasurer.

**Mark M. Miller** was appointed sales manager of the Indianapolis plant of **National Malleable & Steel Castings Co.** He replaces **A. L. McColloum,** retiring after more than 30 years

EPHRAIM N. OSTERBERG
*. . . directs purchases at Stewart-Warner*

ARNOLD K. BROWN
*. . . AMF exec. V. P. & director*

MARK M. MILLER
*. . . plant sales mgr., Nat'l Malleable*




# HYDRAULIC SYSTEM KEPT LIKE NEW

## Sunvis 916 Effects Substantial Savings; Strainers and Lines Kept Sludge-Free

A copper tubing manufacturer uses an oven with hydraulically operated doors to heat billets to approximately 1550F. The ambient temperatures around the hydraulic mechanism are abnormally high, putting the hydraulic fluid to a severe test of stability. Failure of the system would halt the piercing operation and result in costly delays throughout the plant.

Since the oven was first put in operation, three years ago, the hydraulic fluid has been Sunvis 916. The original charge has never been changed and is still in excellent condition, though the system is tight and requires only a minimum of make-up. Oil lines and strainers are completely free of sludge. Seals and packings are sound. Operations are never interrupted for oil changes or parts maintenance. The company expects to retain the original charge of Sunvis 916 in service indefinitely, effecting large savings in both oil and maintenance costs.

Sunvis 916 is a solvent-refined oil of the highest quality.It is fortified to resist the oxidation and sludging so detrimental to the efficient operation of hydraulic systems. Sunvis 900 Oils are *good for the life of your machines*. For your copy of the illustrated booklet "Sunvis 900 Oils" write Department S-5.

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# *FROM A STEELMAKER*

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Here at Wisconsin Steel we are producing every ton of steel our furnaces can turn out—and we're working round the clock to do it. Yet we still can't always meet the steel requirements of all our customers.

But we can and will continue to produce steel as fine as strict metallurgical control can make it. And we can and will continue to be completely honest about our ability to deliver. When we promise delivery, you can be sure your order will be shipped as promised, and you can be sure there will be no compromise in quality.

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**180 North Michigan Avenue, Chicago 1, Illinois**

# WISCONSIN STEEL

G. WAINE THOMAS
*. . . V. P. at Continental Motors*

ROBERT C. PALMER
*. . . V. P. at Ingalls Iron Works*

LAWRENCE E. MOCK
*. . . treasurer at Harbison-Walker*

with the company. **John H. Murphy** was named assistant sales manager.

**G. Waine Thomas** was elected a vice president of **Continental Motors Corp.,** Muskegon, Mich. He joined the company in 1942 and in 1948 became chief engineer, automotive division. He continues his duties as chief engineer.

**Andrew M. Kennedy Jr.** was appointed director of purchasing in charge of steel procurement for **Westinghouse Electric Corp.,** Pittsburgh.

**Elmer E. Legge,** general manager, Henry & Wright Division, **Emhart Mfg. Co.,** is now also general manager of the firm's V & O Press Co. division in Hudson, N. Y. Appointed as acting factory manager of V & O is **Gilbert T. Coovert,** with the press company as personnel director since last October. Mr. Legge succeeds **Herman F. Zorn,** resigned.

**Richardson-Allen Corp.,** New York, manufacturer of selenium rectifiers, appointed **Dr. Harry N. Walker** as vice president in charge of sales.

**Thomas G. Lanphier Jr.** was appointed assistant to the president of **Consolidated Vultee Aircraft Corp.,** San Diego, Calif., and will be in charge of policy planning in the guided missile field.

**Robert C. Palmer,** former assistant vice president, **Ingalls Iron Works Co.,** Birmingham, was elected vice president. Mr. Palmer also is assistant vice president, Ingalls Shipbuilding Corp., Decatur, Ala., and Pascagoula, Miss., and vice president, Steel Construction Co., Birmingham, both Ingalls subsidiaries.

**Harry S. Golden** was appointed production engineer on all defense projects at **Buick Motor Division,** Flint, Mich., General Motors Corp.

**Jack J. Tipton** was appointed chief project engineer, **Hays Corp.,** Michigan City, Ind.

**Standard Pressed Steel Co.,** Jenkintown, Pa., appointed **C. W. Hollingsworth** divisional sales manager. He is succeeded as manager, Unbrako socket screw division, by **Raymond N. Gruber.**

**Joseph D. Schantz** was appointed chief electronics engineer of **Bell Aircraft Corp.,** Wheatfield, N. Y.

**John H. Mackey** was appointed assistant superintendent, Brier Hill blast furnaces, **Youngstown Sheet & Tube Co.,** Youngstown. He succeeds **Roy H. Nelson,** appointed assistant superintendent, Hubbard blast furnace.

**Lawrence E. Mock** succeeds **W. Forman Bickel,** resigned, as treasurer of **Harbison-Walker Refractories Co.,** Pittsburgh. Mr. Mock joined the firm in 1949 as a staff accountant.

**Edward R. Preiss** has retired as treasurer and a director of **Korhumel-Heffron & Preiss Steel Co.,** Evanston, Ill. **N. F. Korhumel,** president, will carry the title of president and treasurer.

**John W. Dawson,** formerly in charge of equipment engineering for Stanford Research Institute, was appointed chief engineer, electronics division, **Sylvania Electric Products Inc.,** at Boston.

Appointment of four new managers to positions in **General Electric Co.'s** turbojet engine plant, Lockland, O., include: **George L. Zimmerman,** manager of assembly division; **Paul Nichols,** manager of development manufacturing division; **A. W. Jacobsen,** manager, parts division; and **Marc A. DeFerranti,** manager of facilities for the plant.

**James G. Nicholson** was appointed superintendent, machine shop division, **New York Air Brake Co.,** Watertown, N. Y. He succeeds **Charles B. Morehouse,** general superintendent, retired after 34 years of service with the company.

## OBITUARIES . . .

**Alexander Smith,** 58, with **Farrel-Birmingham Co. Inc.,** Ansonia, Conn., for the last 25 years, and since 1947 assistant chief engineer, died Apr. 27.

**Charles G. Van Brunt,** 81, who served as a chemist in the research laboratory, **General Electric Co.,** Schenectady, N. Y., for 41 years until retirement in 1945, died May 2.

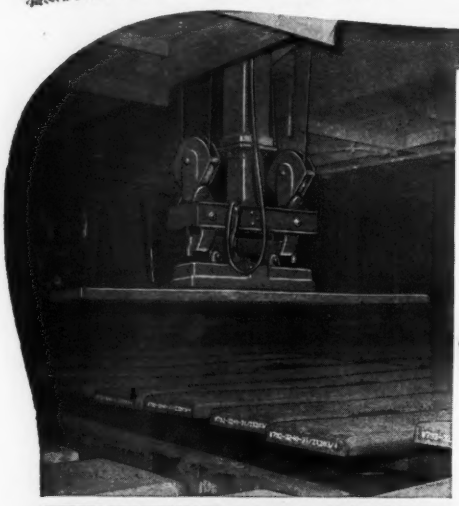
**George Timmerman,** 71, proprietor of **Rex Plating Works,** Detroit, died May 1.

**William K. Norris,** 75, a founder of **McQuay-Norris Mfg. Co.,** St. Louis, died May 3. He was named an honorary chairman of the firm last year when he retired as chairman.

**Frank E. Balson,** 57, production controller at **Canadian General Electric Co.,** died May 1 in Toronto.

**Charles M. Metzler,** 45, secretary, **Rausch Nut & Mfg. Co.,** Cleveland, died May 4.

# *In many ways* EC&M PRODUCTS *serve* ALAN WOOD STEEL COMPANY *on its 125th anniversary*



### MAGNETS

**The *All-Welded* EC&M Type SW Lifting Magnet speeds handling in ingot yard.**

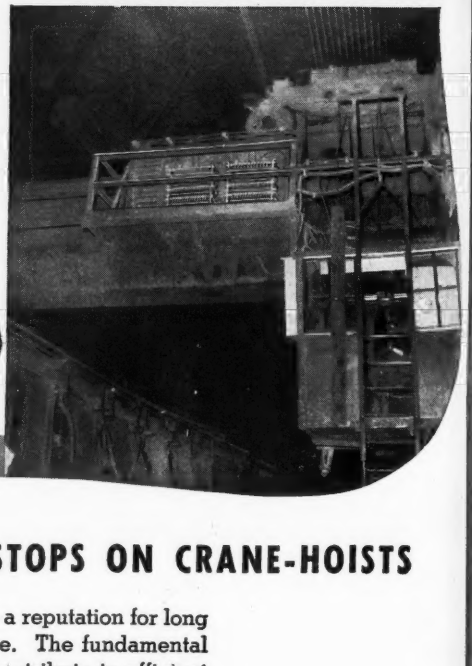
**EC&M Type P Magnets of Bi-polar design turn over slabs for scarfing operation. Note stirrup-hanger for magnet.**

### CONTROL

**Time-Current Magnetic Controller for Coke Oven Pusher Ram.**

### RESISTORS

**TAB-WELD Resistors are now used on ladle and other mill cranes.**



## *also* YOUNGSTOWN SAFETY LIMIT STOPS ON CRANE-HOISTS

EC&M Magnets and Motor Control have a reputation for long life with low upkeep in steel mill service. The fundamental features built into all EC&M apparatus contribute to efficient operation with minimum inspection and maintenance.

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**THE ELECTRIC CONTROLLER & MFG. CO.**
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

# Production AND Engineering
## NEWS AT A GLANCE

**NEW LIGHT ON SHOT PEENING**—Trend to softer and less brittle shot for peening operations on steel parts has hoisted doubts over its efficacy because it had been supposed shot needed to be harder than the material it was striking if fatigue properties were to be improved; and further the roughened surface didn't "look" right in comparison with good shot-peened pieces. So, a leading spring corporation set up research to find out, using six different lots of shot, four of them averaging 0.016-inch diameter, one 0.028-inch and one 0.048-inch. The larger sizes were the old white cast iron; the smaller included two types of heat treated white cast iron, steel and plain white cast iron. Hardnesses ranged from Rockwell C-27 up to C-65. Samples were standard fatigue test coiled springs of 0.148-inch oil tempered carbon steel valve spring wire. Highlights of the test results: No significant effect on endurance limit of the springs as a function of shot hardness; no effect of varying size of shot, within certain limits; shot life inversely proportional to hardness; no relationship between Almen sample arc height and endurance limit.

**PRECISION CASTING DESIGN**—Accepted rules for good sand casting design are just as important when it comes to considering castings made by any of the various investment processes. Precision cast parts offer timely appeal because of conservation possibilities in the cast metal itself, as well as in pattern dies. —p. 80

**BOND FOR SILICONE RUBBER**— A thin, light-colored liquid primer for bonding silicone rubbers to metals or ceramics, applied by dip, spray or brush and air dried in 20 minutes, provides shear strength of about 700 psi in bonds between silicone rubber and steel. One application may be shock and engine mounts which will stand up under both high and low temperatures; another improved rubber-glass laminated structures.

**BRIGHT BUT FOR HOW LONG?**— Little apparent change is seen in bright metal decorative trim on passenger cars now moving from assembly lines in steady volume, but most of them carry printed tags cautioning owners that many of the chromed parts require special care—no abrasive cleaners or steel wool, just plain water and frequent waxing. The reason: Bright surfaces have been coated with a clear baked lacquer which will not stand rough treatment. And the explanation for the lacquer is the restriction against use of nickel for plating on other than functional exterior parts like bumpers and hubcaps, which means that either the thin chrome plate is applied directly over zinc in the case of die castings and over copper on steel stampings, or that the parts have been bright zinc plated. Both need lacquer to prevent moisture penetration and disintegration of the plate.

**PLANTS IN MINIATURE**—If you can afford the time and expense, it is handy to have a scale model in transparent plastic of your manufacturing plant, along with the various accoutrements such as conveyors, cranes, machinery, maybe even a few model workmen. Elaborate layouts of this sort are common around the big Detroit automotive plants which find them handy for figuring equipment changes, materials handling procedures and safety precautions. —p. 86

**QUICK LOOKS HERE AND THERE**—Automatic flame hardening both edges of rolled steel bulldozer center blades while still hot from a bevel-cutting operation is being done at a speed of 10-12 inches per minute, bringing the edges to 550-600 Brinell to a depth of ¼-inch . . . A four-blade 19-foot propeller, largest ever built for turbine engines, is being put through its paces by the Air Materiel Command at Dayton, O. . . . *Glareless "curtain wall" panel construction for building exteriors comprises fluted sheets of stainless steel on the outside, carbon steel on the inside, sandwiching 3 inches of glass insulation* . . . Ordnance's new finish for magnesium is called HAE in honor of its discoverer, H. A. Evangelides. Brown in color and applied electrolytically, it is better than dichromate in resistance to galvanic corrosion, has high melting point, good dielectric strength and hardness . . . *An automotive company which has pioneered mechanization of the shell molding process for ferrous castings has been asked by the Air Force to see what it can do with application of the process to two widely different types and sizes of alloy steel parts— a landing gear hinge for a heavy bomber and turbine blades for jet engines* . . . Numerous types of magic powders now on the market, claimed to rejuvenate "dead" storage batteries, are actually combinations of magnesium and sodium sulphates in various states of hydration and in fact have no effect on battery life or performance—on authority of extensive tests made by the National Bureau of Standards . . . *Silica-thickened greases have been found to stand up well in laboratory tests comparable to the punishment inflicted on wheel bearings and their lubricant in a truck driven in a tight turn at 50 mph for 10,000 miles.* —A.H.A.

*Metalworking Outlook—p. 43* *Market Outlook—p. 143*

Large 310 stainless steel investment casting now in volume production is this diffuser nozzle for the Wright Turbo-boost engine. This part weighs about 17 pounds as-cast and measures 13.4 inches outside diameter. The 15 blades are used as-cast and polished. Location of the inner face of the outer shroud ring, about 12 inches in diameter and the outer face of the inner shroud ring, about 8 inches in diameter, is held to within 0.010-inch and used as-cast. Courtesy Midwest Foundry Co.

# INVESTMENT CA

## Conserve Crit

**By transforming metal into finished parts with a minimum of conversion waste, investment casting can stretch the available supply of strategic materials**

IN THOUSANDS of applications of the more common alloys containing nickel, chromium, copper, tin and other restricted metals, investment casting is a useful means of maintaining maximum unit production from increasingly limited metal supplies.

The most obvious reason an investment casting conserves metal is the degree of precision with which its dimensions may be held with respect to the desired finished part size. In addition, extremely accurate production controls of metallurgical processing techniques are necessary for controlled casting in investment. These two factors minimize the formation of waste metal during finish machining operations as well as the quantity of irreclaimable foundry process scrap.

**No Excess Mass**—Most well-designed investment castings can be used either as-cast or after the removal of 2 per cent or less of the casting mass. Even large parts which have been properly designed for investment casting require the removal of not more than 10 per cent of the cast metal. Occasionally experimental designs are cast which incorporate as much as 20 per cent excess bulk. Usually, such a part is not suited for the process because the unnecessary mass complicates the investment process controls.

Where the finish stock involves from 10 to 20 per cent of the cast metal volume, reconsideration of the design will usually permit tightening the limits, reducing the amount of metal requiring removal in finishing. Such redesigned parts usually are easier to cast.

It is possible to reduce metal volume appreciably where an investment casting has been designed to replace a unit which was formerly composed of two or more component parts. In such assemblies, each subcomponent has to include excess metal which functions merely as a means of affixing the pieces one to the other. In the process of joining the parts, additional metal is usually involved. Since each joint is a source of potential failure, the masses involved in connecting must be sufficient to resist all design stresses anticipated in the joint areas. Very often the investment cast replacement for assembled units weighs less than half of the former unit and is more shock-resistant as well. The overall materials conservation which is obtained by use of the cast part includes not only the direct per piece mass difference, but also the metal wastes which were involved in preforming each component of the assembly.

**Lightening Holes Designed In** — Incorporation of lightening holes and pockets is not only good economy in mass but is generally one of the basic design rules for production of strong investment castings. Usually it is not only cheaper to make the part by casting it with least surplus mass, but the best casting design principles require avoidance of the surplus.

The casting should incorporate strengthening details such as ample radii in corners and tapered section changes. In the machine-produced part it is usually not possible to avoid sharp corners where surfaces have been machined, and it usually is too costly to taper blend section changes. Through the logical use of fillets and other stress reducing details, useless weight can be avoided and the functional value of the part can be enhanced, when the part is investment cast.

**Die Steels Saved**—Conservation of alloy steels required to manufacture dies used in forging or die casting is of less consequence than the conservation of metals made possible through the use of investment cast parts to replace machined pieces. However in the aggregate conservation of die quality steel can become important. Most pattern dies for producing wax, plastic or mercury disposable patterns for investment molds are made from free machining low carbon steel.

The pattern dies which are not steel are made of a low melting "soft" metal based on various compositions of tin, lead, zinc, bismuth and cerium. Soft

# CASTING

## Critical Materials

By RAWSON L. WOOD
*President, Arwood Precision Casting Corp.*
and
DAVIDLEE VON LUDWIG
*Consultant*
Brooklyn, N. Y.

metal pattern dies require very small quantities of these metals. When the life of such tools has been passed they are readily remelted to make new ones. Life of the carbon steel dies is usually extensive. Runs of hundreds of thousands of patterns have been obtained from properly constructed and operated unhardened steel dies. Where an equal number of parts would be required from forging dies, they would have to be replaced many times to produce the required amount.

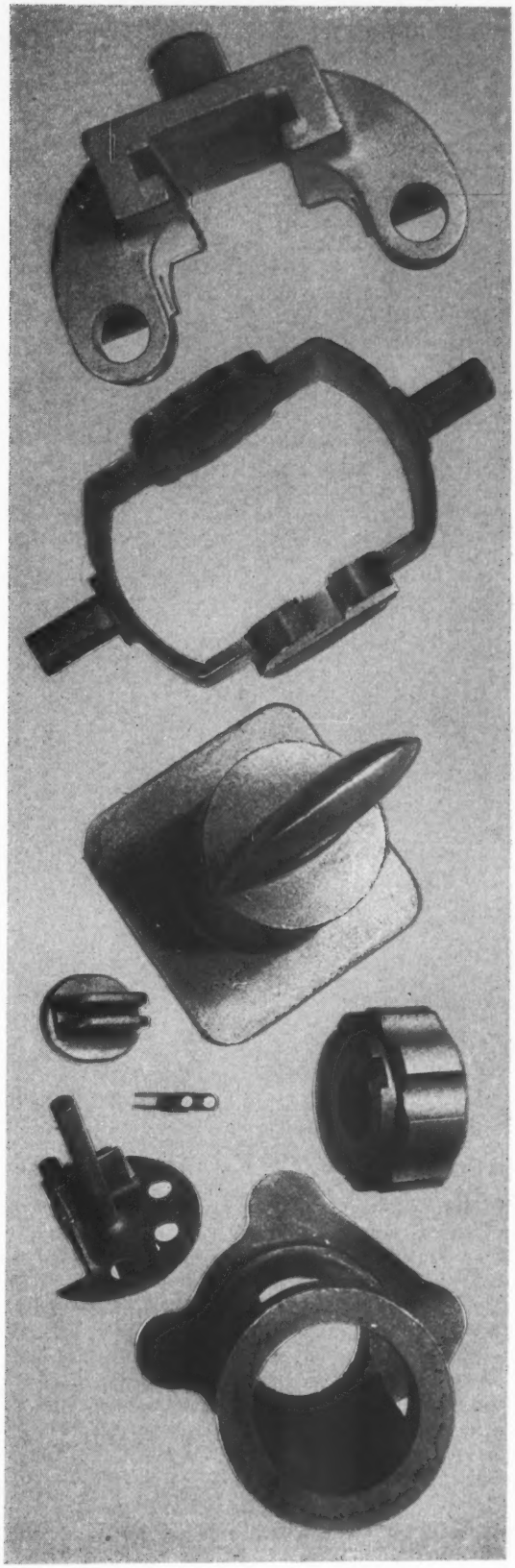
Dies for investment casting patterns are designed to minimum dimensions so that they usually are easily operated manually. This is possible because no excessive pressures or temperatures are involved in forming waxes. Stringent controls are not needed in the production of wax pattern dies which are made from commercial grades of unalloyed steel.

Small size and relative simplicity of producing dies for investment casting use is reflected in the low capital investment involved. As a rule the pattern dies cost from 10 to 20 per cent of the cost of large pressure dies required to make the same parts by either forging or die casting.

**Production Expedited**—Production of new devices is expedited when the investment process is used, not only through the time saving secured in tooling to produce the parts, but also in the ease with which new details may be incorporated in the part designs when needed. Very often the details of military equipment take some time to reach a stable form. It is advantageous to be able to change existing tools rather than make new ones.

The ability to rework most pattern dies enables designers to add desirable details which would be impractical to incorporate in the part were it necessary to scrap the production tools. As a result improved designs based on performance of finished parts make it possible continually to refine the part to eliminate nonfunctional mass and improve the serviceability of the unit.

A minor, but potentially important conservation factor is involved in the reduced requirement for al-

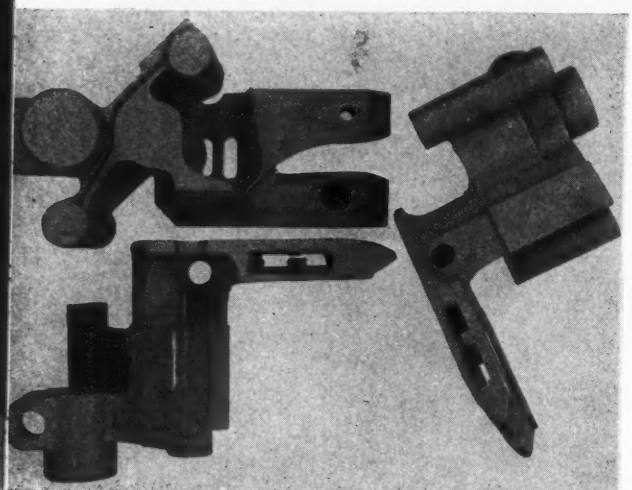


This group of stainless steel parts illustrate the normal size and complexity of parts being investment cast. Actual size

loy steel or carbide cutting tools where investment castings replace machined parts. Where complex designs in difficult machining alloys are converted to investment castings, the saving in tool costs alone is often a large proportion of the inherent economic advantage of the conversion.

Most investment cast parts may be finished with ordinary tools. It usually is advantageous to use alloy steel or carbide cutters because the number of finish cuts per grind on such tools is so high, due to the slight amount of metal removed per cut from most investment castings, that the elimination of tool redressing operations and set up time more than compensates for the slightly higher cost of the cutting bits.

**Waste Offsets Cost**—Investment casting normally cannot compete with high volume automatic production processes. However the necessity to secure maximum yield of useful parts from limited quantities of metal may minimize the cost differential, and sometimes offset it completely. For instance, the free machining stainless steels, types 416 and 303, were developed to make possible production of volumes of



Industrial sewing machine part cast in beryllium copper and heat treated to 40 Rockwell C for wear resistance

parts by automatic machine tools methods. However, where conversion efficiency becomes substantially less than 50 per cent, the economic factor of waste of the costly alloy bar stock often is great enough to offset the admittedly more costly investment casting technique.

Careful cost analysis has shown that the finished piece price of suitably redesigned investment castings of stainless alloys is often less than the cost of the screw machined part because of the reduction in metal waste.

**Watch Design!**—To obtain maximum advantage of the material saving features of investment casting, the part must be properly designed for the process. Here are some rules to observe either in detailing new parts or in redesigning parts formerly made by other methods.

1. Avoid all nonfunctional mass. Core all areas which are not under load or are not required to shield moving parts; core all holes which are to be subsequently finished, where the dimensions permit this to be done.

2. Avoid isolated heavy masses, particularly when they are located so they must be filled through thin sections. If these areas cannot be cored to equalize their mass with the surrounding metal, they must be located on surfaces where they may be gated or they will tend to show shrinkage cavitation.

3. Fillet all section changes. As a rule the fillet radius should be from two to three times the thickness of the thinner section. Avoid excessive fillet radii because of the danger of inducing shrinks thereby.

4. Allow adequate stock for finishing but avoid excessive finish stock. The usual finish tolerance is from 0.010 to 0.025-inch depending upon the size of the part and the alloy being cast. It is seldom justifiable to have less than 0.010-inch stock for finishing because it is no more costly to remove that amount than a lesser amount. Castings with insufficient finish will not clean up uniformly. Stock in excess of 0.025-inch is unjustified on most properly designed investment castings.

5. Avoid details such as cast threads which can be easily machine produced. The best cast threads are a class-one fit, after being chased to remove surface irregularities. Wear on dies and taps often is worse in skimming the cast surface than in actually cutting into the metal to produce the required thread. Threads should be specified only in the unmachineable alloys or when a loose fit is acceptable in the part that is being designed.

6. Avoid extensive thin walled areas, especially uniformly flat or curved surfaces where freedom from minor imperfections is essential. It is best to relieve thin walls, where functionally possible, by coring out unloaded portions or by breaking the continuity by ribbing either or both sides of the section. The ribs help feed metal to the thin walls, strengthen them when suitably proportioned and located, and reduce the tendency for particles of investment to spall off into the casting.

7. Maximum and minimum section thickness should not exceed 5 to 1 for optimum control of casting density. Observance of the suggested rules for elimination of nonfunctional mass usually will produce parts that have a close conformity to the proper proportion.

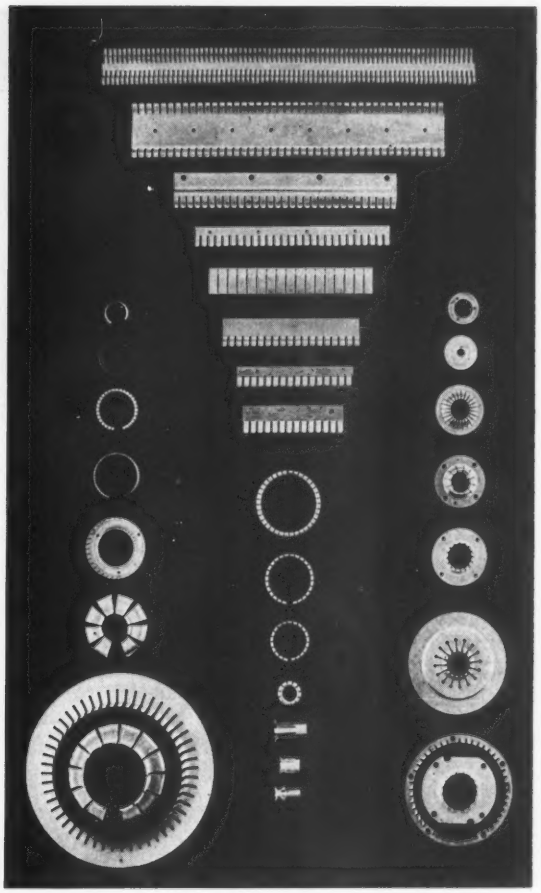
The accepted rules for good casting design as applied in other foundry product designs are relevant to the investment process. There are detail differences in types and intricacies of cores, location of surfaces which may or may not be gated, selection of parting line locations etc., which differ not only in basic process control but also in different investment foundries. Therefore the intended sources of supply for investment castings should be consulted during the design development of new parts in order to obtain maximum utility of the process.

# BERYLLIUM COPPER

## *Shoulders Defense Jobs*

**High-strength alloy in form of castings, strip and wire is finding many military equipment applications, particularly in control devices and instruments**

By JOHN T. RICHARDS
*Development Engineer*
The Beryllium Corp., Reading, Pa.



Typical beryllium copper sand castings used in heavy electrical, machine tool and ordnance applications

TWENTY YEARS ago beryllium copper first was offered on a commercial basis in the U. S. Since then industry has successfully applied the material in a host of military and civilian uses. The progress made perhaps can best be described by considering three periods.

The first or developmental period extended from 1931 to about 1941. As has been the case with other new metals, beryllium copper was heralded by widespread publicity inferring it to be the answer to virtually all design problems. As a result, misapplications and unforeseen fabricating problems were frequent. There were, however, notable exceptions, particularly where designers took full advantage of beryllium copper's properties and engineered their products accordingly.

The war years 1942-1945 comprise the second period and gave important impetus to the alloy. With greater emphasis on precision, beryllium copper was called upon to fill the needs of many exacting military applications. These demands led to improved production and fabricating techniques.

Having originally attracted attention as a spring material, beryllium copper was employed in a number of successful wartime applications in other fields, which suggested new peacetime uses. The same properties that offer advantages in the design of springs were found equally useful during the third or postwar era for bushings, bearings, cams, molds for plastics, resistance welding electrodes and similar uses.

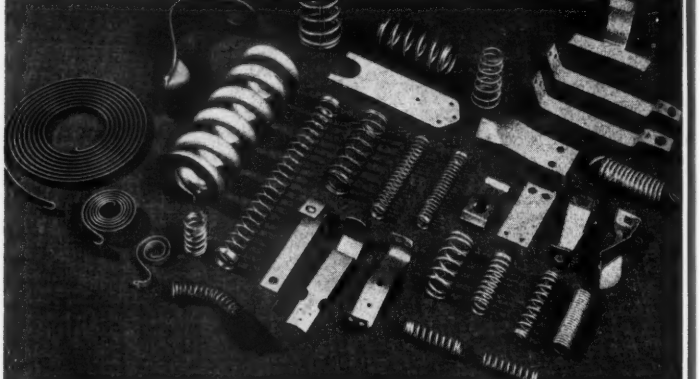
At the same time, the original 2 per cent beryllium content alloy was modified and improved. In addition, new alloys have been developed, so that the term beryllium copper now refers to a family of wrought and cast materials, each age-hardenable and offering a different combination of useful properties.

Comes now a fourth phase—a period where emphasis is placed on defense production, with civilian requirements secondary.

Here is where beryllium copper fills an important niche in the defense picture. Its excellent strength, substantially higher than other copper alloys, makes possible decreased cross-sections with important savings in strategic metals. In certain cases, savings in copper as high as 30 per cent have been realized in the production of some components.

Equally as important, however, may be the space saving opportunities offered by beryllium copper. If compactness is a virtue in the design of refrigerators and automobiles, it is a necessity for many military items to insure portability and maximum efficiency. On the other hand, the high strength of beryllium

Electronics parts, including contact fingers, grounding strips and circular contacts for microwave circuits, radar and other high-frequency applications, all formed from beryllium copper strip



Assortment of flat, compression, power and brush springs made from beryllium copper strip and wire

copper can also be used to provide maximum sensitivity in pressure responsive elements. For example, in designing a beryllium copper diaphragm to replace one of phosphor bronze, the engineer can reduce the diameter for a more compact unit or hold the original dimensions to obtain added sensitivity over an equal working range.

In addition to good elastic strength, this alloy also provides excellent resistance to fatigue, corrosion and wear. This means longer life in the field, fewer replacement parts and greater efficiency through decreased overall costs. In many cases, the protective coating applied to ferrous parts for corrosion protection may be eliminated by specifying beryllium copper. Beryllium copper also will withstand severe operating conditions, ranging from tropical to subzero atmospheres.

With today's emphasis on precision, beryllium copper is finding wider application in instrument and control equipment. Freedom from drift and hysteresis in critical springs and diaphragms means greater accuracy in gages and indicators, while resistance to relaxation insures positive action in switches and contacts.

Of perhaps equal significance is the degree of dimensional control obtainable in beryllium copper parts. Through fixture heat treating, angular and flatness tolerances can be held to limits not otherwise possible, thereby eliminating hand adjustment frequently necessary to compensate for variable springback. In addition, unhardened beryllium copper can be severely cold formed, then heat treated to a level of strength and hardness not attainable with materials deriving their temper solely from strain hardening. With cold worked alloys, such as brass or bronze, some compromise between formability and strength is generally necessary.

Beryllium copper in the present emergency is finding its way into all phases of the defense program including: Aircraft, guided missiles, weapons, electronics, construction equipment, atomic energy, ships, communications and machine tools. Applications range from miniature switch blades to heavy switchgear members and from investment-cast peep sights to sand-cast gun mounts.

Although certain uses of beryllium copper are new, many are similar to existing consumer applications. For instance, the same basic properties of beryllium copper diaphragms in automobile heater control units will apply for airspeed indicators, altimeters or manifold pressure gages. Similarly, in many cases miniature tube sockets developed for radio or television sets can be employed in electronics equipment for military use.

## Needed: $35 Billion in Equipment

While industry prides itself on efficiency, manufacturing industries in this country need at least $35 billion worth of new equipment to raise facilities to first class technical standards. At the first two industrial electrification forums, Hoboken and Newark, N. J., April 10 and 12, under auspices of General Electric Co. and Public Service Electric & Gas Co., New Jersey, E. G. Dudley, manager, industrial divisions General Electric Co., said machines designed since World War II are, on the average 40 per cent more productive than older equipment; that 95 per cent of industry's machine tools are at least 10 years old and that productivity of metalworking industries could be increased by at least 10 per cent by replacement of tools.

Improved materials handling equipment and methods might well cut handling costs 25 per cent and save annually 650,000 man-years of unnecessary labor. As much as 40 per cent of workers' time goes into moving materials and parts in many manufacturing plants, Mr. Dudley declared.

Attended by 200 New Jersey industrialists, forums were the first in a series of six to be held in Paterson, Metuchen, Trenton and Camden. Major subjects covered are: Power distribution, adjustable speed drives, heat treatment, materials handling, industrial lighting, automatic controls, scheduled maintainence, electrical know-how in industry, research and power.

By GUY HUBBARD
*Machine Tool Editor*

# *Seen and Heard in* The Machinery Field

**WHAT'S A MACHINE TOOL?** One of the biggest headaches of the machine tool industry is caused by persisting ignorance on the part of the public and our Washington bureaucracy as to the nature of machine tools. What are they, what do they do, what do they mean to our national economy and to national defense?

Many attempts have been made to define machine tools in a popular way, but unfortunately many of these definitions have fallen wide of the mark. Typical was that by the late General Hugh Johnson of NRA fame, made when he was a newspaper columnist. After much fanfare about his intimate experience with the metalworking industry (which was true), he went on to give his version of a machine tool. His description was vivid, but unfortunately the thing he described was a punch press, not the "machine which removes metal in the form of chips."

I have just received from John W. Glynn, advertising manager, Barber-Colman Co., Rockford, Ill., a copy of the April, 1951, issue of that company's house organ *Hobbing Notes*. This embodies one of the sincerest efforts to answer the question, "What is a machine tool?", that I have seen in many a long day. I hope that Mr. Glynn has had some extra copies of this publication to "spot around" in strategic places —including some places in Washington where there is crying need for better understanding on the subject.

Barber-Colman's handling is not in the form of sugar-coated mental pill which can be swallowed at a gulp. The subject is too complicated for that kind of treatment. What they have done is to devote 14 pages of concise text and 17 beautiful illustrations to the evolution of precision machine tools from the dressing down of the casting to the testing and approval of the finished machines. Much emphasis is placed on the handicraft work—including scraping and spotting of slides—which contributes to the accuracy and long useful life of the machines which make machines.

To may way of thinking, Barber-Colman have made a fine contribution to the good cause of better understanding of machine tools at this time when there is dire need for better understanding. As John Glynn says in his letter to me "—this is a subject that is near and dear to your heart." That certainly is true. It should be true of a lot of other people—specially those holding key positions in national defense setup.

**WHAT THE OTHERS EXPECT:** At a time when powerful forces outside our country are trying to hinder our industrial efforts by sowing dissension, it is important that we do not perpetuate any home-grown misunderstandings between groups which should be working in harmony. The best way to insure harmony is to develop mutual understanding.

This was driven home to me recently when I sat in a roundtable discussion between machine tool builders, distributors and users on the subject of what each group expected of the others. The surprising thing was that some of the things which were expected, had been unsuspected.

Some of the interesting points that came out were the following. There is a growing tendency for big builders to use small distributors—for the simple reason that they get more attention from distributors who do not spread their efforts too thin.

By the same token, modern, complicated machine tools demand more technical knowledge than old line dealer men ordinarily possessed. This can be countered by hiring better men and by better training of such men by the machine tool builders who will depend on them as field representatives.

As far as the distributors are concerned, they were severely critical of advertising and sales literature put out by some of the builders. As soldiers on the industrial firing line, they feel that they know good sales ammunition from bad.

Also, they complained that factory visitations of dealers are not well planned by builders to inculcate the most knowledge in limited time. Furthermore, these should be made sales refresher courses for the older men as well as indoctrination for new men.

When it came to hearing what a big user expects both of builders and dealers, some surprising facts came out. According to this user, machine tools have become overly complicated—thus adding unnecessarily to their cost and making them overly difficult for persons of limited skill to operate.

As far as distributors are concerned, this user stated that study of quotations by distributors' sales engineers would heighten the belief of the user that such men really do take a personal interest in customers' problems.

Above all, the user condemned the "sell-and-run" distributor who never returns to check up on the machine to see that it starts off right and keeps on running satisfactorily. The man who doesn't lose interest as soon as a sale is made will keep on making sales.

**ADVERTISING IDEA EXCHANGE:** From time to time extremely interesting things are sent to me from headquarters, National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6.

That description certainly applies to the first issue of *Advertising Council Idea Exchange*. Through this quarterly publication the advertising committee of the association will keep very much alive the idea of co-ordinated advertising thinking and co-ordinated advertising action among metalworking machinery makers.

The whole machine tool and press industry is a comparatively small one. Its importance, however, is such that its voice should be no still small voice crying out in the wilderness that is Washington today. A chorus of 200 small voices—properly co-ordinated —can rise to impressive volume. A chorus of 200 small advertisers—properly coordinated—can exert powerful influence on a national scale.

# Models Aid Factor

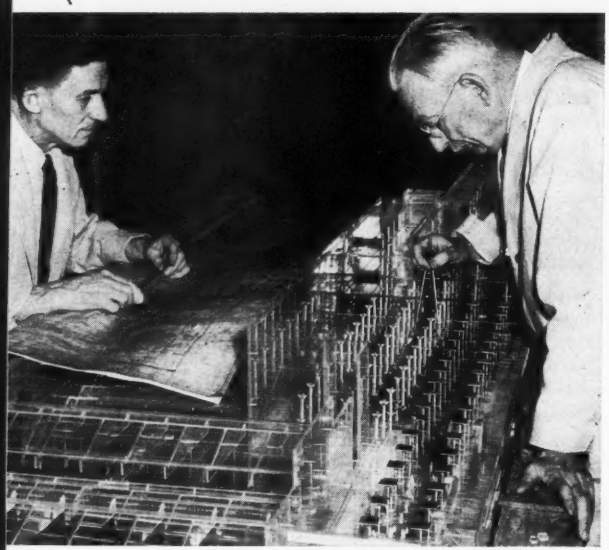
Complete Briggs plant recreated in miniature—⅛-inch to the foot

PLANT engineering department of Briggs Mfg. Co., Detroit, has acquired a new tool to help bridge the gap between proposed changes in factory layout and their execution. Detailed scale models are proving their worth in catching miscalculations before they go too far. Other uses of the models are to spot points of importance in safety engineering, to aid in visualizing materials handling operations, to determine manpower requirements. For ascertaining how best to convert some of its production lines to other products, the models are expected to be of inestimable value.

Briggs' project is not unique. Models have been used for several years by many types of companies for a variety of purposes including display and promotional activities. Several firms have been organized for the express purpose of supplying models of machinery and equipment for such plant layouts, and some specialize in construction of the whole model.

Briggs was not interested in the exceptionally high degree of professional prowess which some of these models exhibit, nor in the scale with which most of these specialists work—¼-inch to the foot. What Briggs wanted were models in which individual pieces of machinery could be easily recognized but were not overly detailed and a scale which would permit the models to be used with the greatest convenience. They selected ⅛-inch to the foot. All parts of their models will be easily accessible in that scale. And in this size, furthermore, the 3/16-inch, ⅛-inch, and 1/16-inch thick Plexiglas which is used for walls and floors, roofs and partitions is easily worked and conforms closely with actual measurements, scaled down.

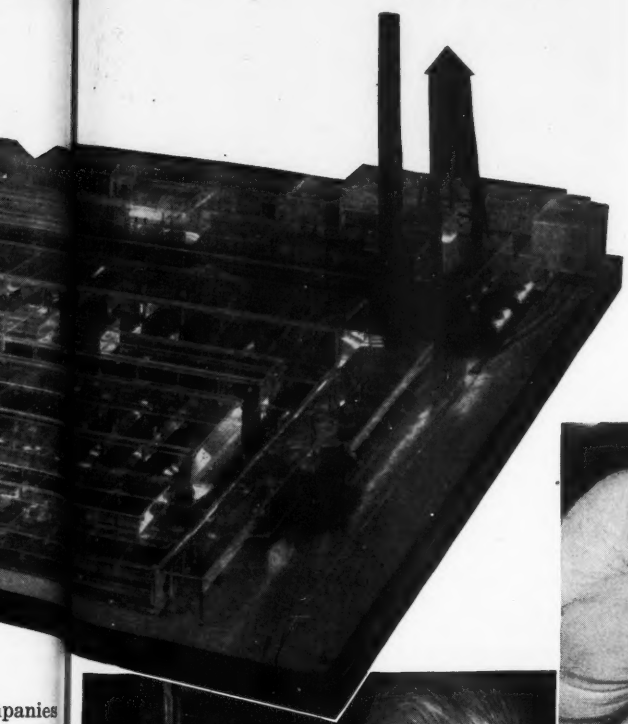
One complete Briggs plant—the Connor facility—has now been recreated in miniature. First section of the Mack plant is currently undergoing finishing touches. To require two additional sections, this model will ultimately be 33 feet long. Other Briggs plans will take their place on table in plant engineering as the project progresses.

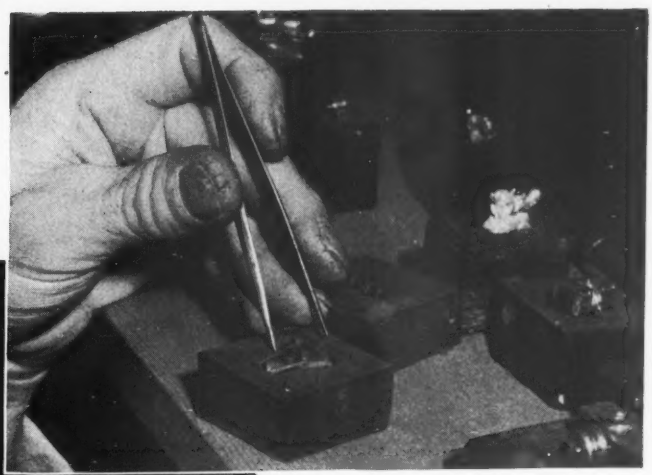


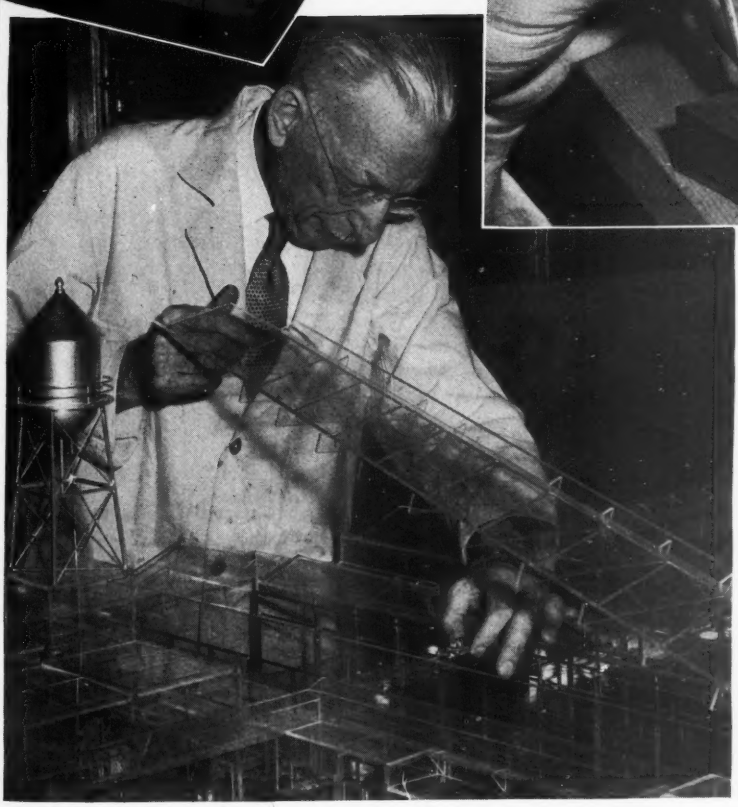
Dimensional accuracy of the model is frequently checked against the plant's blueprints. Every important construction detail is faithfully reproduced

# ayout Planning

Even dies are changeable in these replicas of Clearing presses. Plastic used for molds picks up every detail of the original pattern, including the grain when wood patterns are used







Above—Models of machinery are cast in flexible molds, formed of cold-pour plastic which is baked at 160°F for about 45 minutes. Patterns are wood or metal, machined to scale. Castings now are phenolic resin, although originally Cerrosafe, a low-melting-point metal alloy, was used. Some of the molds and patterns of machine tools and office equipment are shown

Left—Cranes are mounted on HO-gage model railroad rails. These also are used with modification for conveyor systems throughout the miniature plants

Right—Drawing compound is swabbed on blank and dipped for second and third draws. A five-man team, two on each side of the press and one at stress relieving, produce over 220 guards per hour

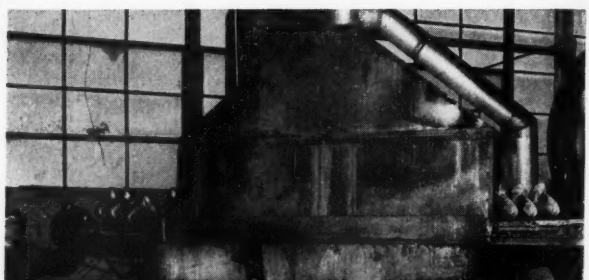
# BUMPER GUARDS

## Deep Drawn 220 per Hour

USING a 450-ton press to deep draw automobile bumper guards from 13-gage steel at a 220-per-hour clip, Ueber Tool & Mfg. Co., Detroit, has reduced operations from 12 to nine, improved surface finish and cut scrap to a minimum. The present three-stage drawing operation is the result of some sound tool designing and production ingenuity, plus correct use of a special drawing lubricant.

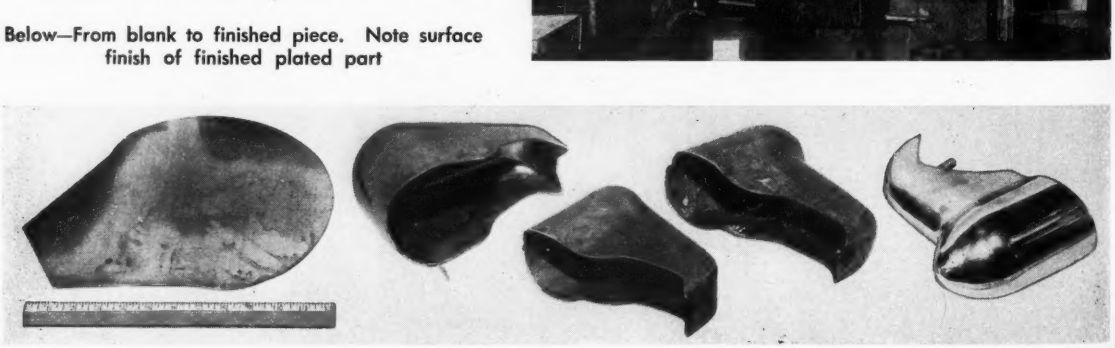
The new production method is illustrated by the accompanying photographs showing the bumper guard from blank to finished product. Drawing compound is No. 478 developed on the job by Pillsbury Chemicals engineers.

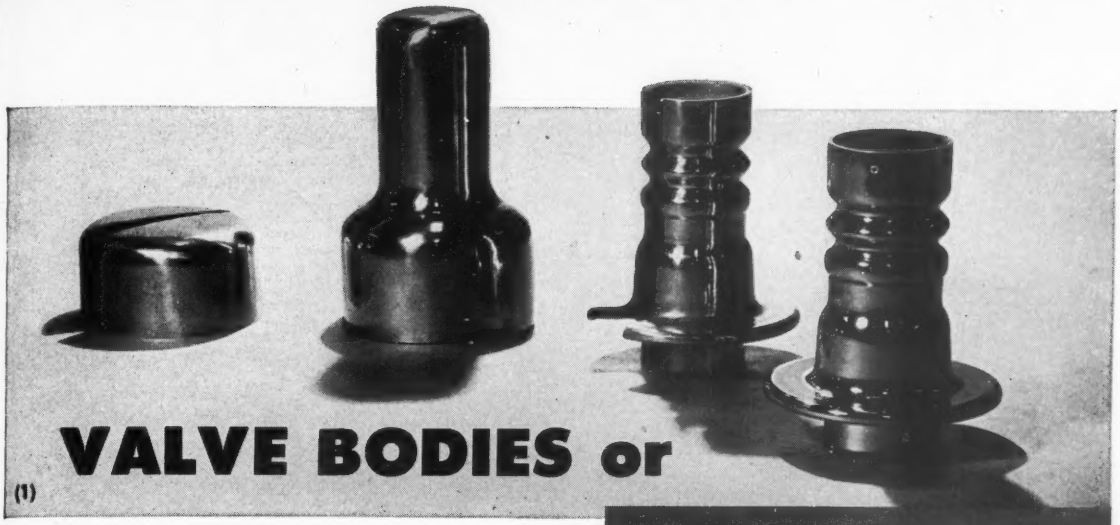
Above—After first draw, parts are stress-relieved, placed on a turntable to cool and be returned for second draw. The 450-ton press carries three dies; each stroke draws three parts simultaneously



Right—Alkali spray cleaning apparatus is simple, continuous belt spray booth. Note difference between cleaned parts at left and compound-covered parts entering at right

Below—From blank to finished piece. Note surface finish of finished plated part

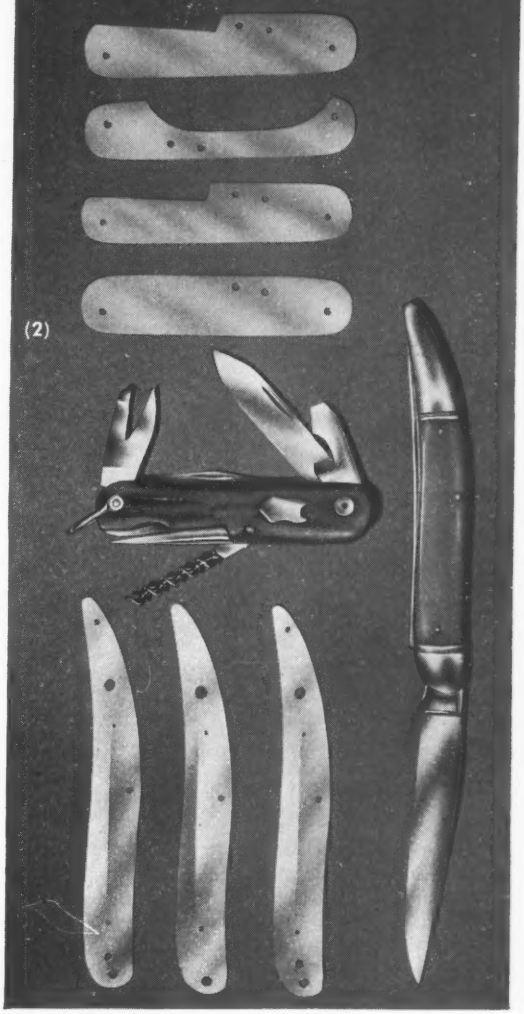




# VALVE BODIES or PENKNIVES

(1)

(2)



## How Two Manufacturers Improved Their Products . . . Pared Their Production Costs

**(1)** This illustration shows only four steps in the manufacture of a valve body from Revere 70-30 Cartridge Brass by Eastern Tool & Stamping Co., Saugus, Mass. Eastern was asked to quote on making this body as a stamping, to replace a casting. Due to the design of the part, it was felt that it would be especially difficult to produce from brass strip. Hence Revere was asked to collaborate on specification and fabrication. A close study of the fabrication steps resulted in the recommendation of 70-30 brass in a certain grain size. The latter is kept under control by Eastern through only two intermediate anneals. The result is a most unusual drawn and formed part, lighter, better, and more economical than the former casting. (Revere has no objection to castings as such. The important thing is to use them only if they are more economical and satisfactory.)

**(2)** Penknives, fisherman's knives and similar items made by the Utica Cutlery Company, Utica, N. Y., contain liners of brass which provide the proper clearances between the blades. These not only have to be blanked to the proper shape, but also must be punched with small holes for the rivets. Some of the holes must be "punched clean" with a minimum amount of burr. Others are produced with a blunt punch so that the metal is extruded slightly around each hole. The Revere Technical Advisory Service was consulted, with the result that Revere now supplies brass in a temper which blanks cleanly, but which also produces the exact amount of extruded metal around the desired holes in the customer's operation. In this case, it was proper temper which eliminated rejections and added to the quality of these already fine knives.

• These two cases are typical of the results obtainable when Revere and a customer sit down together to share their knowledge with each other. In these times, when more and more companies are planning to switch to Defense Orders, such collaboration can be exceptionally valuable. May we work with you?

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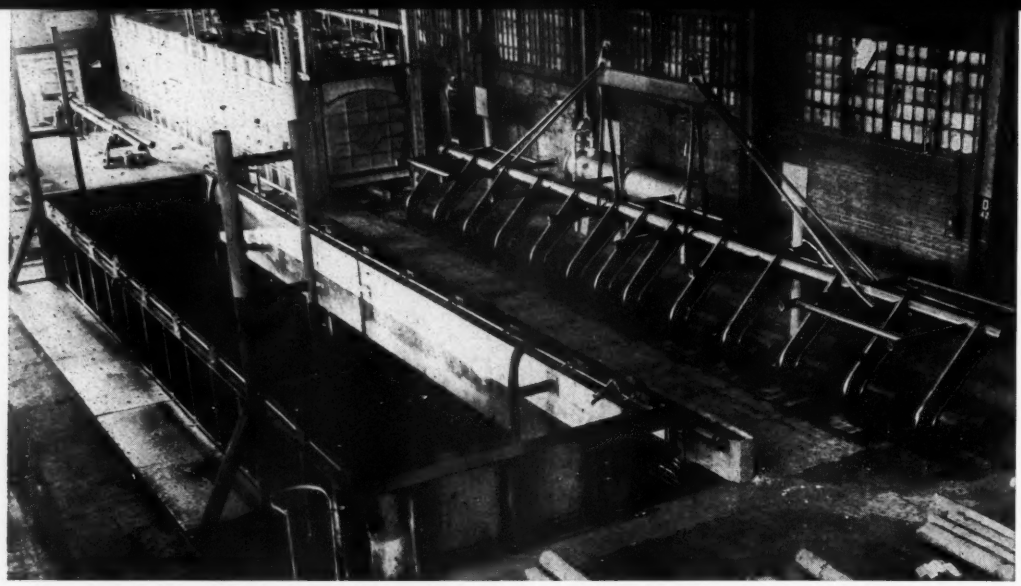


General view of collar heat treating installation. Fifty-five-foot furnace is seen at left background. Handling hook is at right and quench tank in foreground

# Metallurgical Factors Affect Drill Collar Performance

By R. J. STOUP
*Plant Metallurgical Engineer*
National Supply Co.
Spang-Chalfant Div.
Ambridge, Pa.

SOMETIMES product improvements in one field can be translated to another. There are close parallels, particularly because of their dimensions and analysis between drill collars and large gun barrels. Because of the more intensive subsidized research on guns, knowledge of this item is further advanced, but unfortunately because of security restrictions the full story cannot be told. A properly made collar of today, if it were the right shape and dimensions, would pass the gun tube requirements of World War II and be acceptable for service by front line troops.

Use of drill collars in rotary drill strings has changed by trial-and-error methods since early in the development of rotary drilling. Of particular significance in recent years is the discovery that straight heavy-walled tubular sections just above the bit are beneficial in two ways. First, the rate of drill penetration is increased. Second, the number of drill pipe failures is reduced.

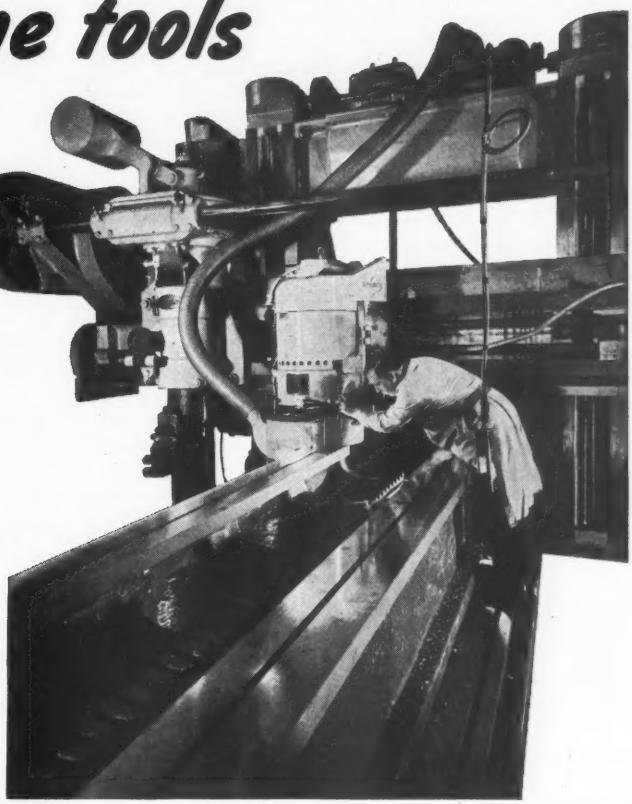
Drill collar stock should be made of fine grained killed steel cast in big-end-up hot topped ingots to secure soundness, uniformity and freedom from piping. In original first processing, avoidance of flakes due to hydrogen should be aided by attention to details of melting practice and a slow first cooling of the steel. By good melting and pouring practice, inclusions are kept to a minimum; however, all commercial steels will have some minor inclusions. Such inclusions, particularly those hard and sharp ended, can conceivably act as stress raisers under alternating loads when they fall just at the finished surface of the threads, but lacking this unfavorable location their effect is negligible. Electric furnace steels are undoubtedly freer of inclusions on the average than basic open hearth; but the extra cost is unjustified for drill collars.

Different steel melting shops have individual likes and preference for particular types of alloy steels, claiming one is harder to produce clean or more prone to flakes. Other mills will maintain the opposite. As far as development of mechanical properties in the finished article is concerned, most users lay great stress on the chemical composition of the steel and are quick to point out minor deviations from published analysis ranges.

In the ordinary heat treated steel whose utility depends primarily on mechanical properties developed by controlled heating and cooling, such properties are essentially conferred only in an indirect way by the alloying elements. Chemical composition

From data presented by the author at the spring meeting, American Petroleum Institute, Division of Production, Amarillo, Texas, Mar. 21-23, 1951.

# How Simmons can rebuild your large machine tools



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is important in steels for corrosion-resistant service such as sucker rods because corrosion is a chemical attack. It counts in steels for high temperature service such as still tubes because stability at elevated temperatures is involved. It counts in steel for very low temperatures although we are not sure just why. But as long as hardenability is maintained, the actual elements used to obtain it are unimportant.

**Forming the Collar**—Three workable alternatives are used for forming the stock: Forging, rolling into a solid round and seamless piercing. Of these three it seems to this observer that forging, perhaps because of its priority, has been over-estimated especially from the quality standpoint. It further appears the possibilities of seamless piercing have been inadequately explored.

The belief has grown that in some mysterious way, forging imparts special properties to steel that no other method can impart. World War II proved it is possible and practical to produce with equivalent quality by rolling, such vital and highly stressed equipment as large gun tubes which were previously exclusively the province of the forger. Not only were many cannon rolled and then cold-bored, but many thousands of the proper sizes to suit the capacities of the mills then in existence were seamless pierced.

Length requirements of collars, which is only a minor restriction to rolling, impose a difficult condition when press forging to shape drill collar stock. Starting with perhaps an 8 or 10-foot long section, the raw material is heated to the maximum working temperature short of melting the steel. It is then slowly kneaded under a press in the open air until it is too cold to deform easily, then reheated and the cycle continued until the collar is finished. Compare this with rolling, where the requisite shape is completed in a matter of a very few minutes.

At the present time, a large majority of drill collars are produced by rolling to a round and boring cold. Although forging does not seem suited to this particular product, there is no question, of course, of the value of the process in forming other objects of more compact and less regular dimensions.

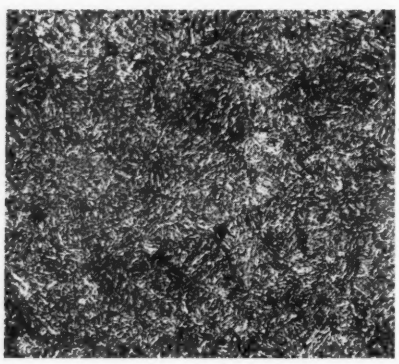
A seamless pierced drill collar offers some very real manufacturing advantages since the hole will be formed at the time of rolling and avoid the slow, arduous cold boring of a rolled or forged round. Cold boring is somewhat more precise as the inside diameter of a pierced tube may wander slightly and on the average perhaps deviate more from the center line of the collar. The bore in a pierced collar will never approach serious thinning of the wall since tolerances of 12½ per cent eccentricity similar to oil country tubular goods are easily maintained.

As long as sufficient passage is afforded wire line coring equipment and survey instruments, this does not seem a serious drawback and the troublesome difficulty of having a hole bored from both ends and failing to meet in the center entirely obviated. On the other hand, somewhat superior steel quality may be expected in a seamless pierced collar. The user of this product can be well assured the possible latent defects in his material have been reduced to a minimum. It is the nature of the seamless process that the expansive force necessary to convert a solid steel billet into a tube by piercing is great enough to tear open or magnify even a minor defect. Actually, the seamless process is a most effective method of inspecting large tonnages of steel.

Although the idea of pierced collars is comparatively new, seamless piercing is an accepted method of forming a number of oil field items beside pipe; for instance, tool joint stock is frequently formed by this method.

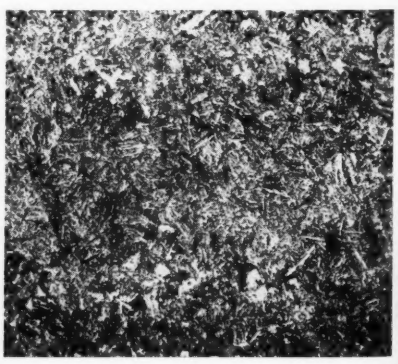
**Heat Treating Necessary?** — One very pertinent question is "Do drill collars have to be heat treated?" The answer for all but the very mildest drilling is undoubtedly "yes." To begin with, the collar is only one unit in the drill string and must be connected at each end to something else—a bit, another collar or sub or a tool joint. Because of the profound influence of such variables as roughness of threads, type of thread dope, makeup torque on the rig and thread deviations, the exact static stress imposed on the material by making a tight connection is not known for the various types of API joints and may vary 100 per cent, but on the average must be 80,000 psi. In addition, the connection must be made and broken many times in the course of drilling a well. On this static stress there is imposed an alternating dynamic stress of unknown magnitude during rotation. To resist these additive stresses, a fairly high level of mechanical strength is indicated—something on the order of 110,000 psi yield strength, 140,000 psi tensile strength and 280 Brinell.

This mechanical strength is not required at the



Left—Completely quenched drill collar. Izod 62 ft-lb, X100 nital etch

Right — Incompletely quenched drill collar. Izod 11 ft-lb, X100 nital etch



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outside surface, but rather at a location some distance toward the bore. To verify this, we need only observe the service failures of drill collars.

The most common drill collar break starts at the pin end near the last full thread at the shoulder and a progressive fracture severs the pin. Less frequently, the crack starts in the box and by a similar action travels to the outside. Depth of this critical location varies with the size of collar and the pitch diameter of the thread, but in many common cases is just about 1½-inch in from the heat treated diameter. We may then take the properties of this location as an important criterion of drill collar quality.

Most drill collars are made of AISI 4100 series steels, that is 1 per cent chromium, 0.20 per cent molydenum at the 0.40-0.50 per cent carbon range. Other analyses known to have been used are the 3100 nickel-chromium type and the 8600, 8700; 9800 nickel-chromium-molybdenum types. We have no information that would lead us to believe any one steel grade has been found particularly outstanding in field results.

The above discussion as to economic factors governing the selection of steel assumed a highly agitated water quench. It is true that other methods of cooling can be used—either air cooling (commonly called normalizing) or oil quench, both being followed by a temper. The common disadvantage of both of these is that their substantially slower rate of cooling demands even more alloy than was needed under water quenching. Such extra alloy additions are expensive and, in addition, at the present time are needed in vital war material.

A water quench is not the perfect answer to all heat treating problems because of the danger of cracking during immersion. However, this hazard can be minimized and the fast cooling benefits still maintained, if the quench is arrested before the piece is entirely cold, and the piece then tempered. There is little difference in cracking susceptibility between the various types of collar steels. Chief consideration in avoiding ruptures consists in having a bar free from light seams and surface defects which concentrate the quenching stresses.

Another procedure by which the cooling rate can be augmented is by quenching in the bored condition. The metal in the center must be removed in any event and if this is done before heat treating either by piercing or cold boring, the ratio of surface exposed to the quench medium to the amount of metal quenched is increased. Because of manufacturing conditions, a bored collar is not always quenched, but there are very real advantages to be gained in speeding up the cooling. Distortion and cracking are minimized by quenching in the bored state. Seamless pierced collars by their process of manufacture must necessarily be quenched with a hole in the center.

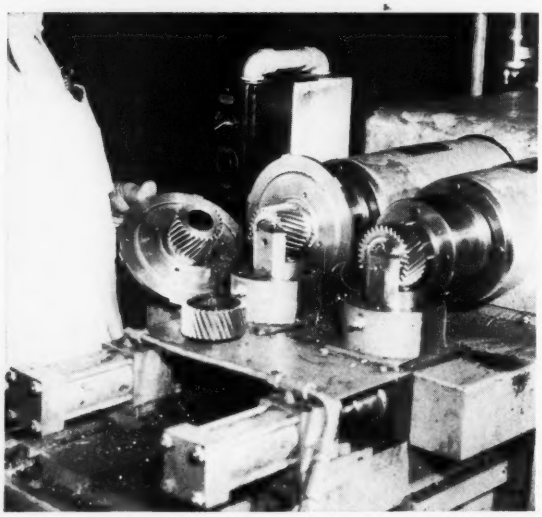
At one large installation the heating furnace is a car bottom type in which the collars are supported horizontally during heat treatment. After being held at the quenching temperature for a sufficient period, five collars are removed at a time by the special handling fixture. They are then totally immersed in a quench tank that contains very highly agitated water.

Agitation on the 42,000-gallon capacity tank is supplied by 26 three-bladed propellers mounted on both sides in staggered relation, each driven by a 15 hp motor. Both furnace and tank are long enough to process 54-foot collars. Quench water agitation is important as influencing the efficiency of the quench and obtaining the ultimate from the steel hardenability. Still water quenches allow a blanket of steam to protect the piece and slow the cooling rate inordinately. Movement of the water breaks up this insulating blanket and cools the object more rapidly. The collars are tempered immediately in the same furnace.

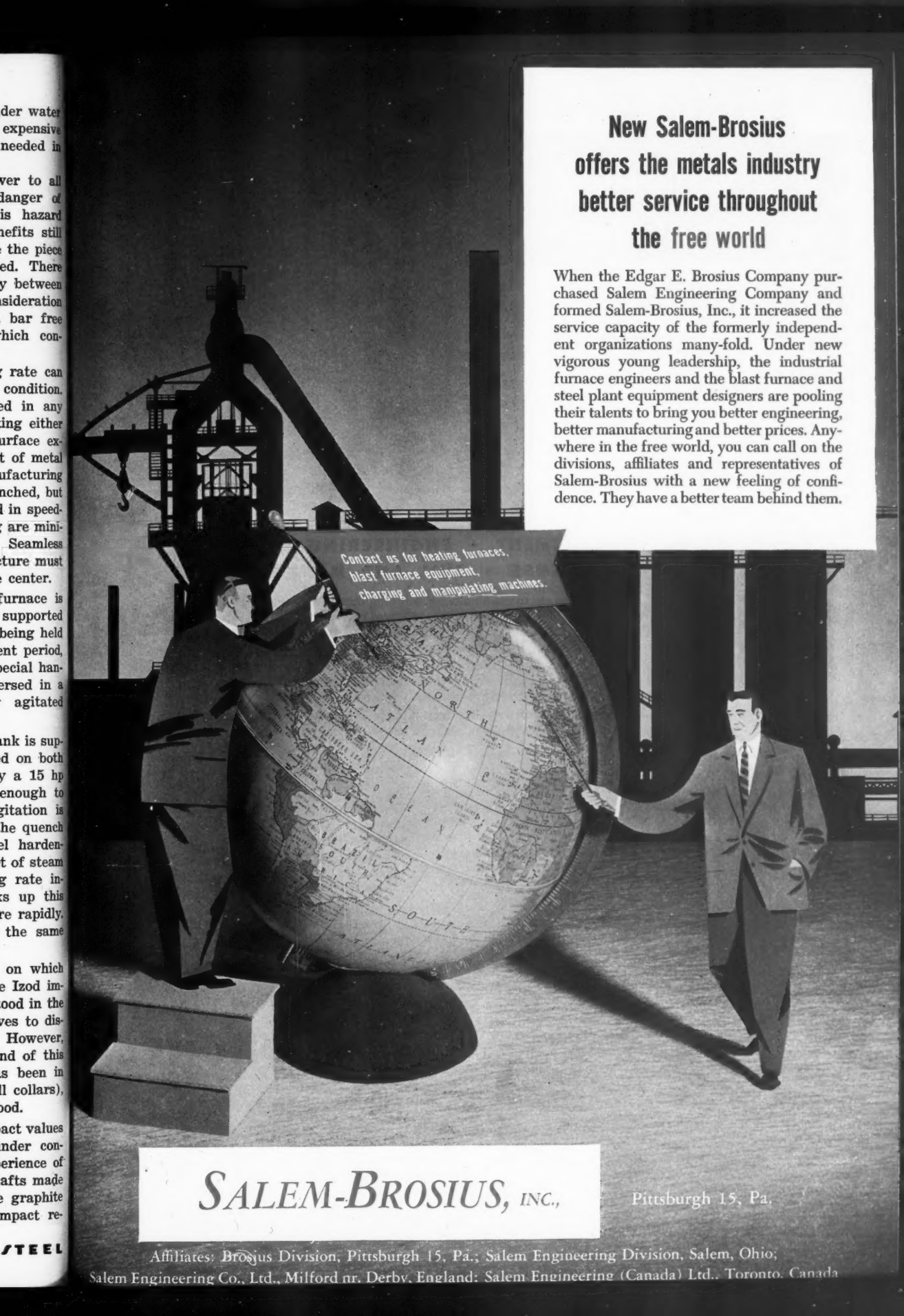
**Izod Impact Strength** — A second value on which minimum control limits might be set is the Izod impact test, a determination much misunderstood in the field. In general, the notched bar test serves to distinguish brittle from ductile materials. However, when one comes to examine the background of this test, it is interesting to find, while it has been in use for 50 years or more (longer than drill collars), it is far from being completely understood.

Classic examples of material with low impact values (under 1 ft-lb) operating satisfactorily under conditions of fatigue can be found in the experience of automotive manufacturers who use crankshafts made of gray cast iron. Here, it is claimed, the graphite which is partly responsible for the low impact re-

## Novel Motions Combined



MACHINING ball races for automatic transmission front pinions and rear sun gears at Packard is accomplished at high speed and precision in this double-spindle New Britain No. 26 "cam New-matic" boring machine. The job formerly was done by a slower grinding process. A combination of motions is involved in the machine, the tool posts pivoting in bearings through a rack and pinion arrangement from the camshaft, while a cam follower traverses the table, with air pressure used to keep the table and cam follower against the cam. Boring bits are tungsten carbide and make three roughing cuts and one finishing cut, the feed on the latter being somewhat slower. A mirror finish is produced on the race, contributing to quiet operation, precision fits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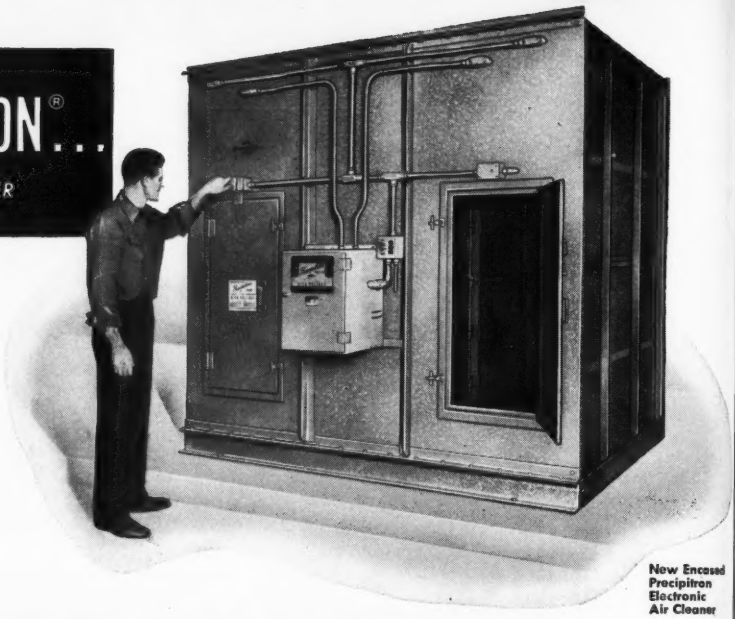

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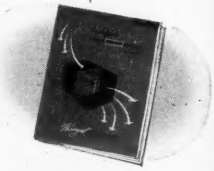

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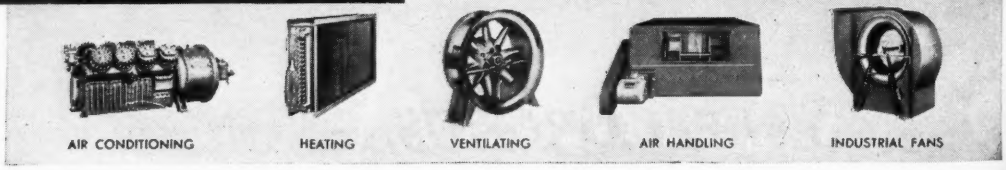

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sistance of the cast iron actually helps to diffuse and distribute repeated stresses so that failures from notch fatigue are avoided. For this reason, if the Izod impact test is of any benefit in predicting the performance of drill collars, it must be in some respect other than as an indication of the notch sensitivity in fatigue.

Different steels give different impact values or the same steel treated in a different way shows variations. If we can ascertain the cause of the differences, if may shed some light on the test and give information obtainable in no other way. There are a number of minor variables such as grain size and the way the steel is cooled from the temper which have a direct influence on the results of the test. However, if we consider two halves of the same piece of steel given different heat treatments to the same hardness, the treatment which hardens the steel more uniformly gives the better impact value. Notched bar impact strength is a "structure sensitive" property; in other words, it is greatly influenced by the manner in which the components of the steel are distributed.

In quenching, if the cooling rate at the point where the Izod bar is taken is fast enough, the steel transforms to a uniform hardened structure.

On the other hand, if cooling is not rapid enough, the carbides separate out nonuniformly following in bands the original nonhomogeneity of the ingot pattern.

A Brinell hardness test will not show much difference between this and the more uniform structure since the size of the Brinell impression is so large. At the speed of an impact test, however, the iron plates act as zones of weakness and the steel under the velocity of stress and the restraint imposed by the notch behaves in brittle fashion giving low impact values.

**Straightness of Collars**—Type of heat treatment has a pronounced influence on the straightness of collars. The milder quenches such as air and oil do not set up such drastic temperature differentials as water, and the collar during heat treatment remains straighter. Water quenching in the bored condition with violent agitation results in a straighter product than water quenching in the solid. The steel is more uniformly hardened.

Detrimental influence of warping during heat treatment can be largely overcome by a stress relieving cycle after straightening. Since straightening involves bending the outer fibers beyond the elastic limit, it induces stresses around the circumference that might affect service unfavorably. Under severe drilling conditions, the locked-in stresses might tend to spring the collar crooked. A stress relieving treatment after plant straightening involving heating the collar to slightly below the tempering temperature and holding several hours relaxes these stresses and obviates field straightness difficulties.

With best drilling practice, however, collars may occasionally become crooked due to circumstances beyond control. In this case field straightening with a portable hydraulic press is frequently done at the rig, but lacking a stress relieving treatment such measures are generally only temporary.

## Annealing and Carbon Restoration Handled in One Operation

IN ONE continuous furnace operation, bars are annealed and carbon restored to their surface at Union Drawn Steel Division of Republic Steel Corp., Massillon, O. This first-of-its-type carbon correction annealing furnace—which replaces carbon burnt out of the bar's surface by previous hot working operations—is regarded as one of the latest developments in the steel industry.

The furnace was built and installed by Surface Combustion Corp. to specifications drawn by J. D. Armour, Union Drawn's chief metallurgist.

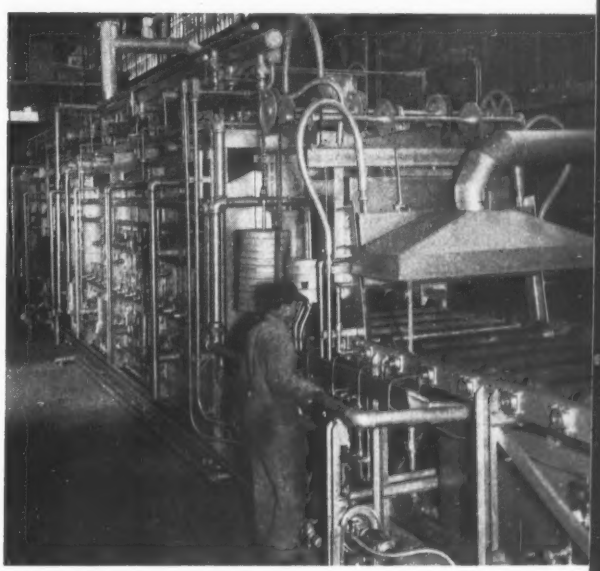
In old style annealing, carbon was lost from the surface of steel bars. This decarburization made the surface too soft for use in many industries, necessitating removal of the low carbon surface by machining or grinding.

**Corrects Surface Decarburization** — Atmospheric conditioning units in the new continuous furnace carry gases containing carbon to the annealing furnace. These gases prevent surface carbon loss in annealing and correct any surface decarburization from previous heat treating operations.

By its use it is thus possible to eliminate grinding or machining operations and to save valuable steel formerly lost in these operations.

Bars produced in this furnace will be widely used in the farm equipment, automotive, machine tool, hardware and household appliance industries.

The new continuous annealing furnace is a further development of a carbon correction process in annealing bars developed by Union Drawn metallurgists during World War II.



This continuous carbon correction annealing furnace recently installed is one of the latest developments in the steel industry

# COLD ROLLING STRIP

## An appraisal of today's theory and practice

**Additional experimental information is necessary to determine compressive strength of strip because of conflicting factors herein presented in the fifth installment. Meanwhile, tensile test strength values are recommended for normal rolling of strip in conjunction with a multiplying factor not greatly in excess of unity**

By J. D. KELLER
*Consulting Engineer and Partner*
*Associated Engineers*
*Pittsburgh*

**PART V**

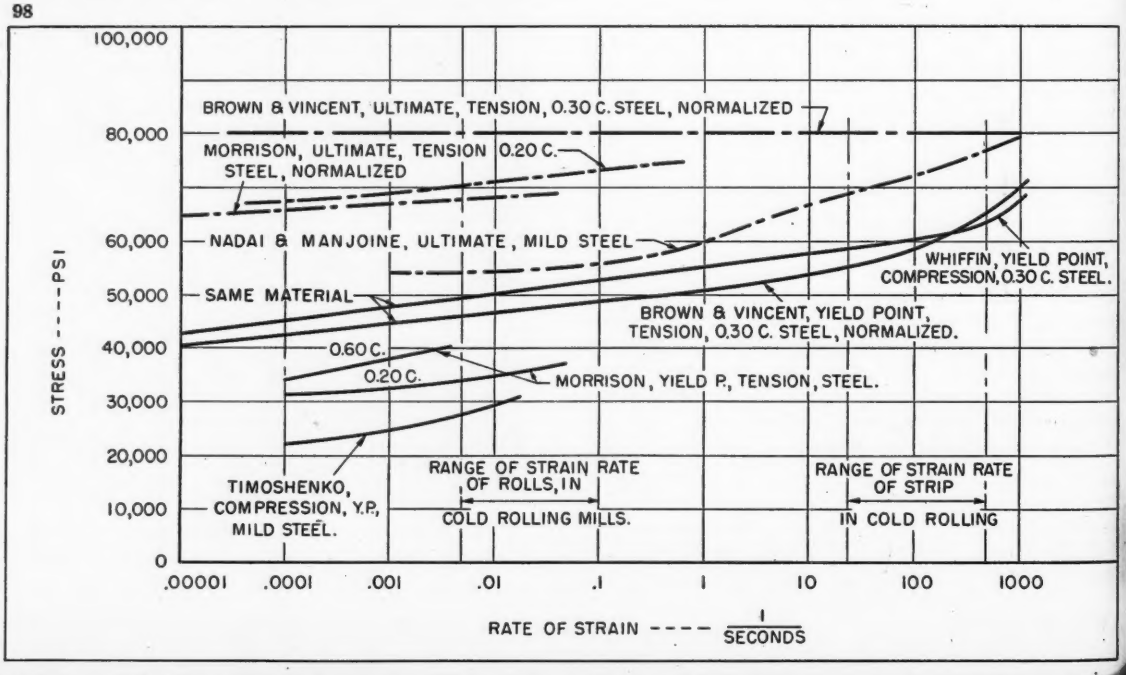
WHEN the stress is uniform, the true yield strength in compression should theoretically be the same as that in tension, at least in ductile materials, and tests made with precautions to eliminate friction effects have shown that this is usually true. Since tensile tests of metals are more easily made with accuracy than compression tests (because of frictional effects in the latter), the yield strength in tension has been used by W. Trinks and the author as the compressive resistance of the metal. Data for mild steel strip material, taking into account the effect of work-hardening, were given in Figs. 3 and 4 of the author's 1942 paper in STEEL, and also by Hayes and Burns.[30] For 0.20 per cent carbon steel and for copper, Ford[4] has published similar results from tensile tests and others from compression tests; the latter, because of the effect of friction on the end surfaces of the specimen and of another phenomenon to be explained later, are about 30 per cent higher at 10 per cent total strain and about 12 per cent higher at 70 per cent total strain, than the values in tension.

**Suppression of Spreading Is Examined.** A condition to be considered is the suppression of spreading in rolling wide strip, where the contact width is very large in proportion to the contact length on the work rolls, and friction reduces the lateral spreading almost to zero. According to the Huber-v. Mises-Hencky theory of the beginning of plastic yielding, which has become rather generally accepted, the yield stress with suppressed spreading should be $2 \div \sqrt{3}$ or 1.15 times the yield stress with free spreading. This accounts for part of the increase of the compressive over the tensile values in Ford's tests.

In rolling, the stress in every case is far from uniform over the length of contact on the rolls. Polakovski[29] has developed an ingenious theory which makes a distinction between nonhomogeneous or subcritical compression and homogeneous or superelastic or supercritical compression, the division between them being set by:

Fig. 19—Increase of strength of steel with speed of deformation





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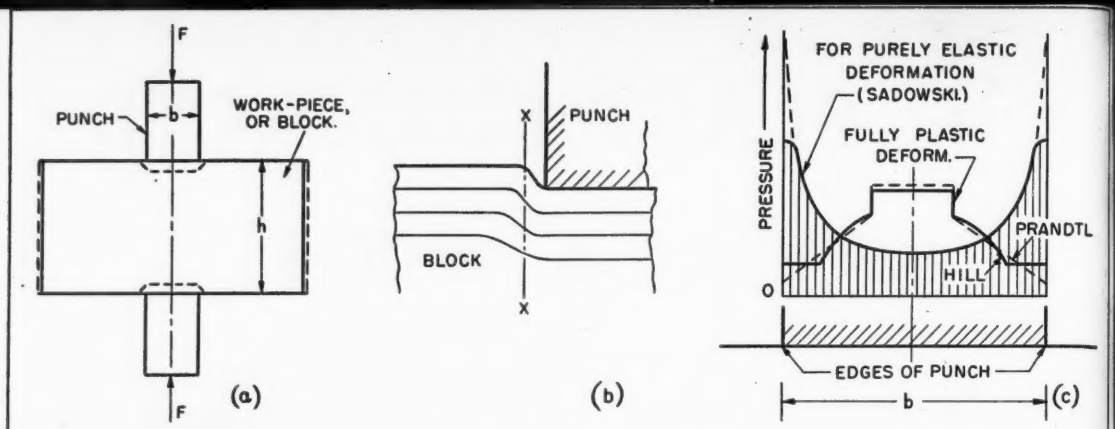



Fig. 20—Deformation of overhanging block by punch, and pressure distribution on punch

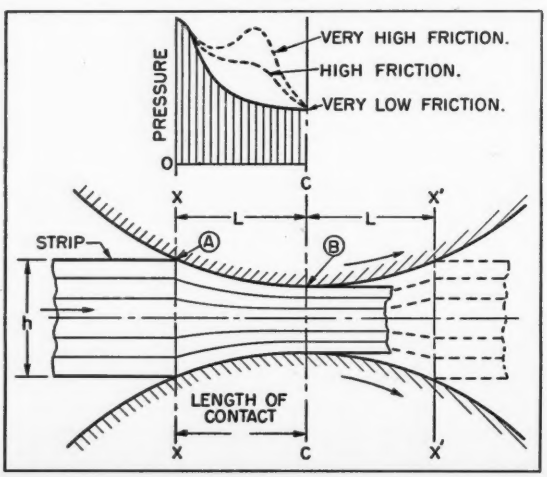
1. Ratio of thickness of the part of the strip under compression to the contact length, and
2. Coefficient of friction of the strip on the rolls, with friction having opposite effects in the two ranges.

He states that the yield strength in nonhomogeneous compression can be even lower than the yield strength in tension, and this seems reasonable. However, Polakovski attempts on this basis alone to explain the observed effects of increase of rolling speed, especially the tests of Ford which showed a slight increase of roll pressure with speed in the first pass and a considerable decrease of pressure with increasing speed in the later passes.

Further experimental data will be needed before this explanation can be accepted, especially since both tensile and compressive tests show an increase, by no means negligible, in the true yield strength and the plastic yield strength when the rate of deformation is increased (see Fig. 19); and Polakovski has neglected this.

**Speed vs. Rate of Deformation**—At a strip speed of 4000 fpm, the rate of deformation of the strip is of the order of 500 (1/seconds), and the yield strength of low-carbon steel is about 35 per cent higher than the low-speed value as obtained in the usual materials-testing machine. Even at only 200 fpm rolling speed, the deformation rate is about 25 (1/second),

Fig. 21—Possible distortions of pressure-distribution curve caused by abutment effect. (Flow lines in strip are from tests of L. Weiss, Zeits. f. Metallk., v 20, (1928) p 302-3; see also W. Trinks, *Blast Furnace and Steel Plant*, 1914.)




and the yield strength is about 25 per cent higher than the low-speed strength. These figures are for plain low-carbon steel, and for material which has not previously been cold-worked. For alloy steels, there seems to be no definite increase with speed (Whiffin[31]). The speed effect will be discussed more thoroughly in a later section.

Other factors affecting the compressive resistance of the strip are the:

1. Increase due to the transmission by shear of resisting forces from the adjacent parts of the strip which are not under compression, and
2. Anisotropy of the strip, or a difference of strength in directions at right angles.

The former was pointed out years ago by the author, in a general way, and has since been studied by Orowan[32] and by Hill[33], who gave numerical values derived from theory. The only experimental results available are those of G. Sachs[34], which seem to agree fairly well with Hill's figures for the increase of total force required for deformation. All of these investigations refer to the simplified case of a workpiece or block compressed between platens or punches which are narrow compared to the thickness of the block, with the sides of the block extending beyond the edges of the punch. Referring to Fig. 20, the punch is assumed to be very long in the direction at right angles to the paper, relative to its width $b$.

**Planes Undergo Distortion**—When the load applied is sufficient to cause plastic flow, the block deforms as shown by the broken lines in Fig. 20-a. Horizontal planes in the block become distorted as in Fig. 20-b; the parts below the punch move downward, while the parts in the overhanging sides of the block try to remain at their original levels. The severe distortion of the horizontal planes at section X−X indicates the presence of great shearing stresses which transmit the compression to the parts toward the left of X−X, and thereby increase the force which must be exerted on the punch to produce plastic flow. This might be called the "abutment effect."

Theoretically, if the ratio $\frac{h}{b} = \frac{\text{thickness of block}}{\text{width of punch}}$ is very large, about 9 or higher, the force $F$ can be as much as 2.57 times the force which would be re-

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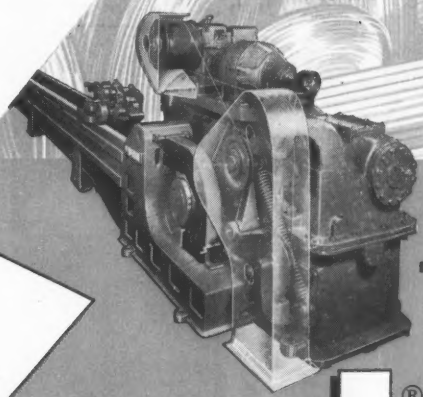

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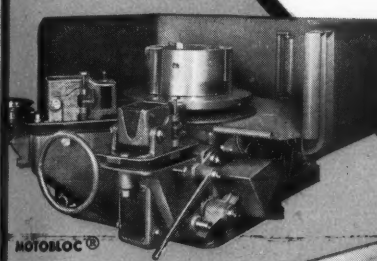

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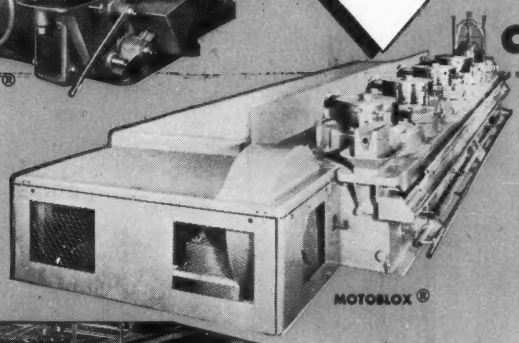

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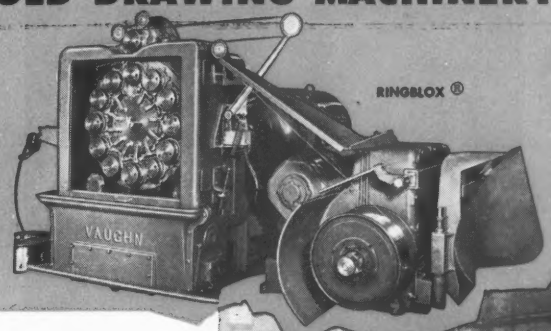


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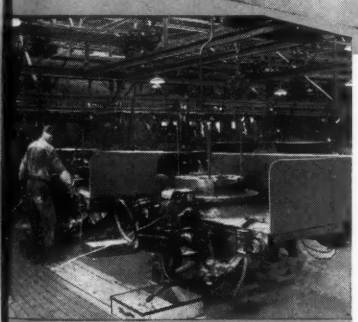

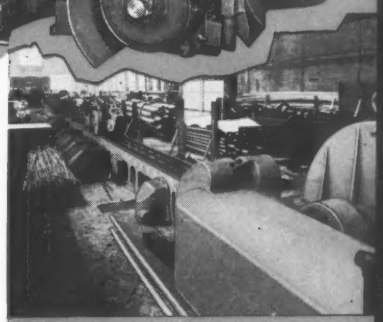

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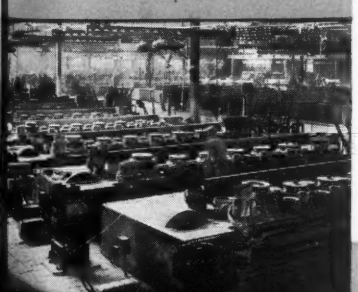

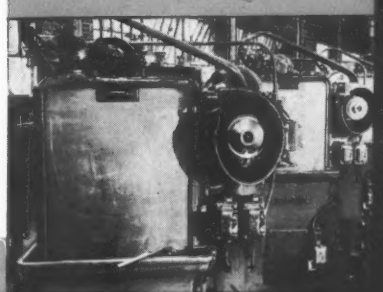

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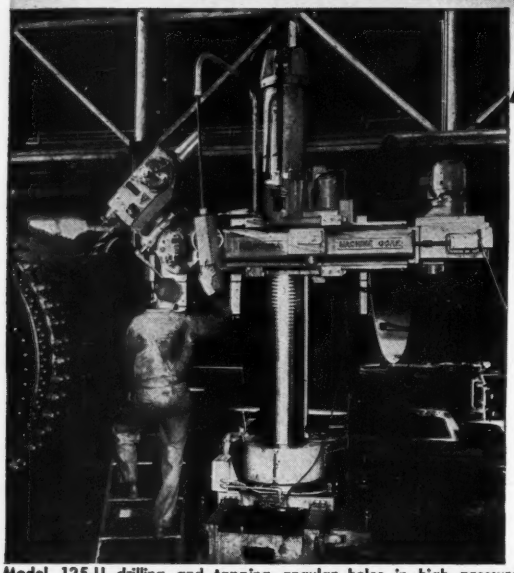

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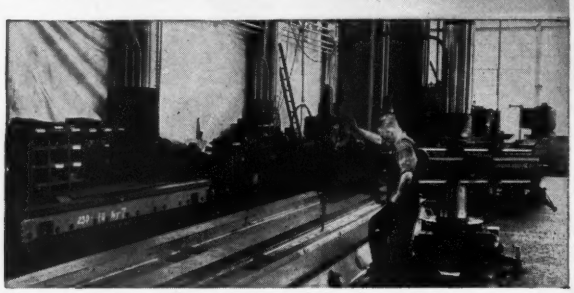

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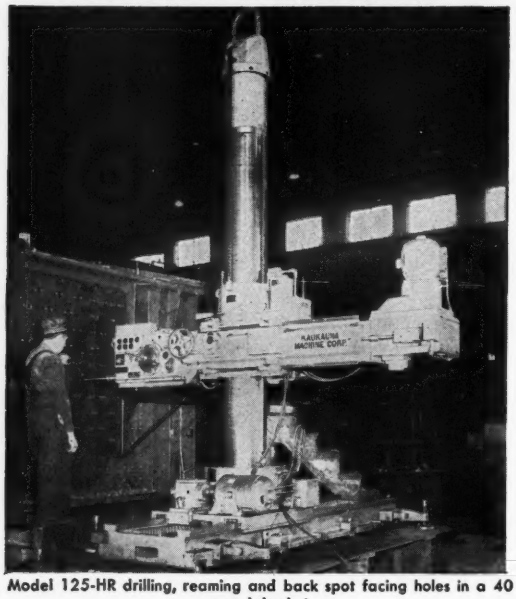

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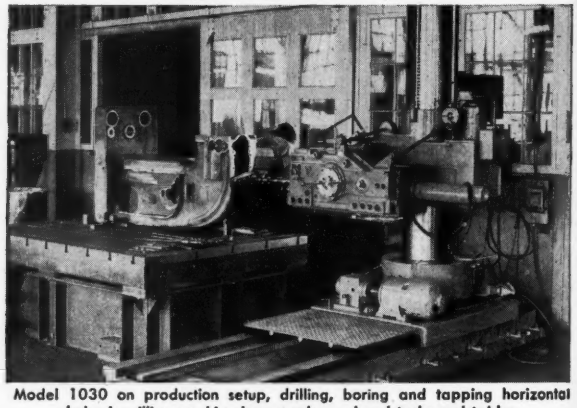

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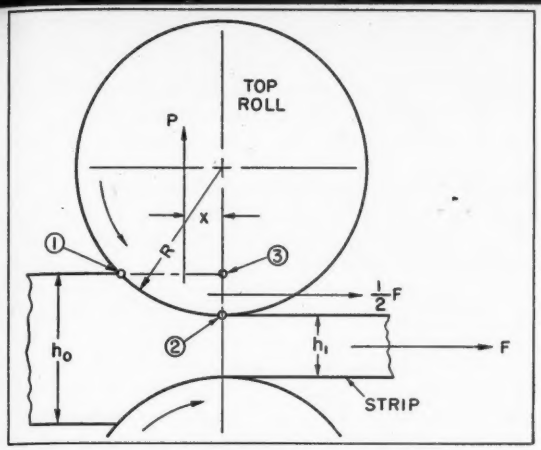



Fig. 22—Relations in calculation of torque

quired if the overhanging ends of the block were not present, or

$F \leqq 2.57 \times$ (compressive strength $\times$ $b$ $\times$ length of punch.) According to Hill[33], as the ratio $h/b$ decreases to unity, multiplier also decreases to unity.

Now if the flat punch is replaced by a roll, it is clear that the same general reasoning will apply. As an example, Fig. 21 shows the distortion of the initially horizontal planes of a bar being rolled, as indicated by lines previously scribed on the side of bar. Again, the severe distortion of the planes at Section X-X shows the presence of high shearing stresses which transmit the compression to the parts of the bar to the left of X-X which have not yet entered between the rolls, and thereby increase the force which the rolls must exert in order to produce plastic deformation. At the end of the contact length, however, there is no transmission of shear to that part of the bar which is to the right of Section C-C; the latter evidently corresponds to the middle of the punch width in Fig. 20, and to make Fig. 21 fully equivalent we must imagine a fictitious or "image" addition to the bar as shown by the broken lines at the right. The dimension equivalent to the width $b$ of the punch then is twice the contact length on the roll, and the ratio equivalent to $h/b$ is $h/2L$.

**Question Raised Concerning Pressure Distribution.**—These considerations raise an interesting question concerning the distribution of pressure on the rolls, as modified by this abutment effect. Even for the simpler case of the flat punch, nothing is known definitely as to the distribution of pressure over the width of the punch face. Both Prandtl and Hill[35] expect the pressure to rise from the edges toward the center, as shown in Fig. 20-c. This distribution, however, is for fully plastic conditions. On the other hand, for purely elastic deformation, Sadowski[15] showed that the pressure is lowest at the middle of the punch width and theoretically becomes infinite at the edges. (Actually it must be finite but very high at the edges, as shown by the bent-over solid-line curves near the edges in the upper part of Fig. 20-c.)

The experimental work of Sachs[34] would seem to cast doubt on the purely plastic theory, since the flow lines appearing on the surfaces of the bars which he etched after deforming, differ widely from those corresponding to the plastic theory. The pressure distribution is, therefore, more likely to be similar to that applying to elastic conditions. Sachs stated:

"The change of resistance with increasing deformation "(penetration of the punch)" can be calculated from the elastic-theoretical stress distribution with a certain approximation to the experimental values. The distribution therefore apparently changes only very slowly at the onset of permanent deformation."

The latter statement would certainly apply to the beginning of deformation in rolling, as at section X-X in Fig. 21, where the transition from elastic to plastic conditions is just starting. The pressure distribution on the roll may then be like the modified Sadowski curve in Fig. 20-c, or the solid-line curve in the top part of Fig. 21. The peak of the curve would lie near the beginning of contact, instead of between the middle and the end of contact as in the usual "friction hill." If, in addition, the coefficient of friction were very high, the pressure distribution curve might then have two peaks or humps, the one toward the left in Fig. 21 being due to the abutment effect and the right-hand one (in broken lines) due to the friction hill.

**Project May Reveal Data**—It will be interesting to see whether, in the several experimental projects now under way in which the pressure distribution along the contact length is to be actually measured, such distorted or duplex curves will be found. It must be emphasized, however, that the abutment effect is noticeable only in cases where the thickness of the piece being rolled is greater than twice the length of contact, and that in strip rolling the effect is (usually) entirely negligible.

Fig. 23—Factor for calculating rolling torque by the method of Bland and Ford. (From *Proceedings*, Instn. of Mechanical Engineers, v 159, 1948, p. 148.)

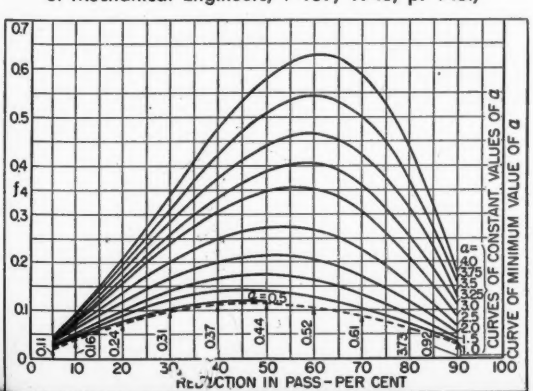
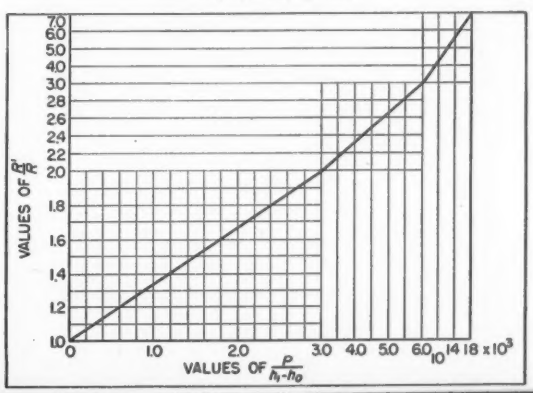



Fig. 24—Graphical solution of Hitchcock's equation for flattened or deformed roll radius, for steel rolls. (From *Proceedings*, Instn. of Mechanical Engineers, v 159, (1948) p 151.)





Hill[36] also studied the effect of anisotropy or variation of the strength or flow-resistance of the strip from one direction to another, in material deformed in only one direction (not cross-rolled.) The author previously observed this effect, at least as regards brittleness, which in severely cold-reduced strip was much greater for bending across than lengthwise of the strip. Ford's tests[4] showed as much as 15 per cent difference in the strip strength in directions at right angles.

In view of these numerous coacting or conflicting factors, the author has felt that ultra-refinement in theoretical modifications of strength test results are unwarranted in the state of knowledge, as of the present. The accumulation of much additional experimental information will be necessary before the problem can be solved completely. Meanwhile, it appears that for normal strip rolling the tensile test strength values may safely be used, with a multiplying factor not greatly in excess of unity.

**Calculation of Torque Required for Rolling**—Bland and Ford[5] have shown that, for the theoretical pressure distribution, the torque can be expressed in terms of the average yield stress, the original or undeformed radius of the work rolls, the thicknesses of the strip entering and leaving the pass, the per cent reduction, and dimensionless ratio

$$a = \text{Coefficient of friction} \times \sqrt{\frac{\text{Deformed radius of work roll}}{\text{Thickness of strip entering}}}$$

and they gave a chart for the variable which depends on the latter two items (see Appendix E.) This development avoids the inaccuracy resulting from calculating the torque as a small difference between two large quantities.

As to checking with Ford's experimental results, however, the values from the new theory deviated, on the average, about 15 per cent from the measured values, being sometimes too high and in other cases too low, but in some cases the discrepancy was as great as 40 per cent.

There is, however, a still simpler method of calculating the torque. About 15 years ago, a student whose name has long been f o r g o t t e n handed in to Professor Trinks a paper in which he stated his solution of the problem of calculating torque, apparently based not on exact reasoning but on a "hunch." He maintained that, since the same effect could be produced either by exerting torque on the rolls or by pulling the front end of the strip, the torque for the two rolls, or 2 *P.x.* (referring to Fig. 22) must be negatively equal to the product of the pull $F$ times the roll radius $R$ (or rather, to be exact, times the vertical distance from a horizontal line through the roll axis to the center of gravity of the arc of contact, length 1-2), assuming that the average pressure in the contact area was not changed by the front tension. The torque then is simply

$$M_t = \text{Average pressure} \times (h_0 - h_1) \times R$$

per unit width of strip, for two rolls.

The condition, which would have to be fulfilled if this method were to be strictly correct, is that the resultant of the equivalent concentrated vertical load and the equivalent concentrated horizontal force acting on the roll within the contact length must pass through the roll axis. The author doubted this, but went to the trouble at that time of checking the torque calculated by the student's method with the torque figured by the v. Karman-Trinks method; calculating the roll flattening and the displacement of the end of the contact length (point 2 in Fig. 22) to the right of the roll centerline, by Hitchcock's equation, and finding the center of gravity of the v. Karman friction hill. This was done for several different sets of conditions, with great pains to obtain accuracy, and the check of the student's simple method with the results of the much more laborious "exact" method was remarkably close in each case—so close that the author has ordinarily used the simple method ever since, for calculating torque.

Only a few experimental data were available from an actual cold strip mill, but the results of the simple method checked quite well with these. They do not check so well with Ford's later test data, but show discrepancies up to 20 per cent or more. Much additional test data from both experimental mills and production mills will be required to clarify this question of calculating torque with accuracy.

*(To be continued)*

## APPENDIX E

### Method of Bland and Ford for Calculating Torque Required for Rolling

The torque equation developed by Bland and Ford[5] is

$$M_t = k_m \cdot R \cdot \frac{h_o^2}{h_1} \cdot f_4(a, r) \quad \ldots\ldots\ldots\ldots\ldots\ldots (13)$$

where $M_t$ is the torque, $k_m$ is the mean yield stress of the strip material, over the contact length; $R$ is the radius of the undeformed roll, $h_o$ is the thickness of the strip entering and $h_1$ the thickness leaving the pass, and $f_4(a, r)$ is a factor read from the curves in Fig. 23 for the applicable values of $r$, the per cent reduction in the pass, and of

$$a = f\sqrt{\frac{R'}{h_o}} = \text{coefficient of friction} \times \sqrt{\frac{\text{deformed roll radius}}{\text{thickness of strip entering}}}$$

The deformed roll radius $R'$ is obtained from Hitchcock's equation or, for steel work-rolls, from the graphical solution of that equation given in Fig. 24. In the latter, the abscissa is

$$\frac{P}{h_o - h_1} = \frac{\text{Total roll force, long tons per inch width of strip}}{\text{Draft, inches}}$$

and the ordinate is the ratio

$$\frac{R'}{R} = \frac{\text{Radius of deformed arc of contact}}{\text{Radius of undeformed roll}}$$

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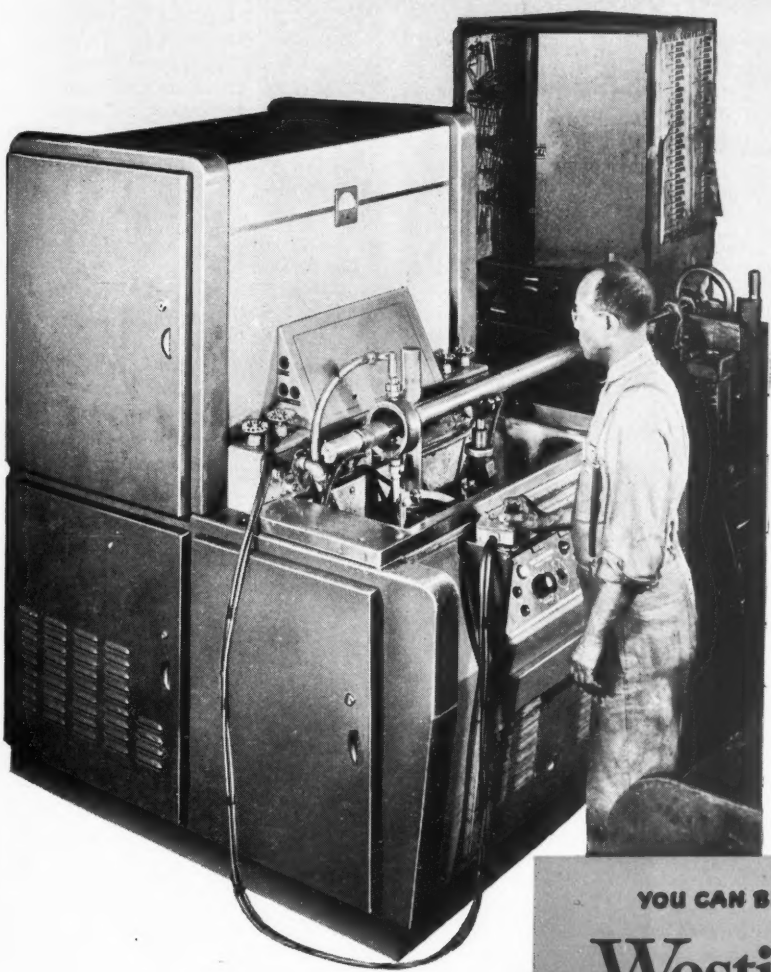
**RF** INDUCTION HEATING...

# *Now even better than before*



***SURE*** — Miehle Printing Press and Manufacturing Company has been using induction heating on about 100 parts for years. They therefore know that for control, for quality, for savings in labor, floor space, and other costs (and for production increases) induction heating can't be beat.

***AND*** — With this experience in mind, Miehle asked about new RF equipment to replace their old induction heating set-up.

***THEN*** — Miehle purchased a Westinghouse 20 KW-450 KC RF Generator. It's used for brazing, hardening and annealing of printing press parts in job-lots. RESULTS: Production up more than 20%, costs cut accordingly (over the former equipment which had already shown clear gains over other methods!).

You, too, can save space, time, and money with Westinghouse RF heating equipment. Write today to Westinghouse Electric Corporation, 2519 Wilkens Avenue, Baltimore 3, Maryland. Outline your specific needs.

J-02227

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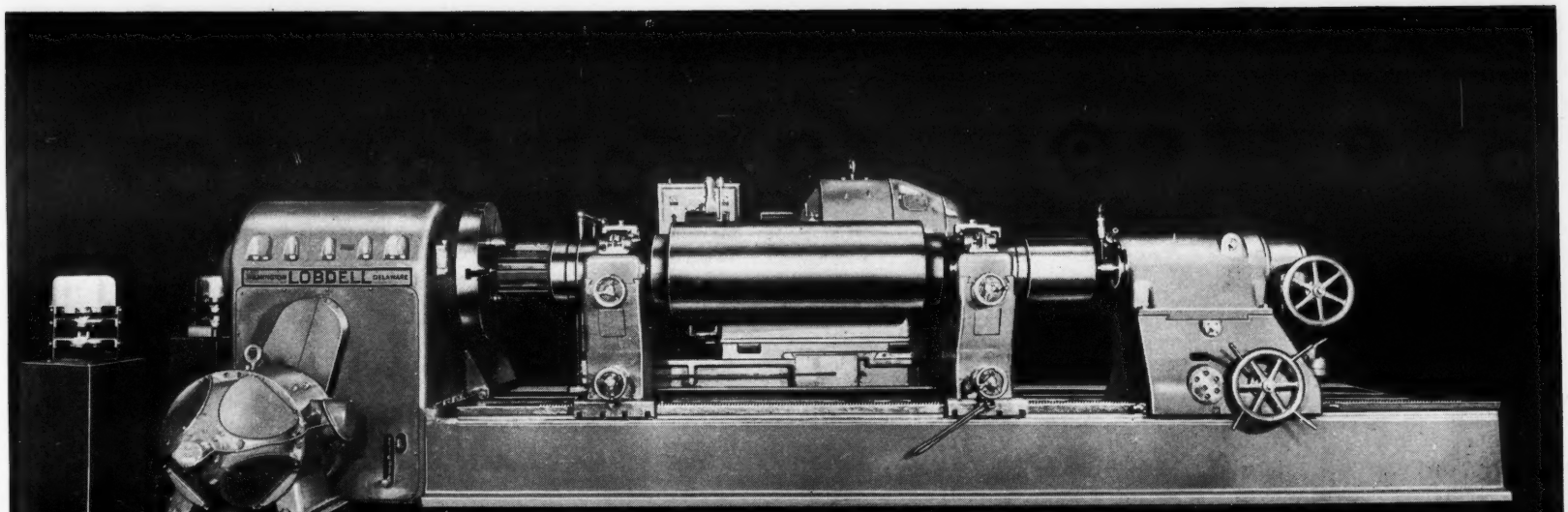
Westinghouse

INDUCTION HEATING

# LOBDELL HEAVY-DUTY ROLL GRINDER

. . . a massive, single wheel, double bed grinder with the design, balance and accuracy of a jeweler's lathe . . . capable of finishing, to close tolerances, rolls up to 50″ in diameter and 164″ between centers. Write for detailed information.




1836

**LOBDELL UNITED COMPANY**
WILMINGTON 99, DELAWARE
A SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY COMPANY

1951

## Tool Developed for Signal Pipe

To make it easier for railroads to comply with recent Interstate Commerce Commission rulings regarding double riveting of signal pipe connections, the Mine Safey Appliances Co., Pittsburgh, developed the Velocity-Power interlock pinner for driving a hardened steel, plain-headed pin through the signal pipe and its internal solid steel plug. The tool uses a small blank cartridge as its only power source.

Mechanical interlocking, used on many lines for operation of signal safety systems, depends on the security of pipe connections for operating safety. In many instances, signal pipe couplings are held by a single rivet through pipe and core on each end of the signal pipe. ICC regulations now require that railroads double this security by applying a second rivet at each point.

The pinner does this job in one operation and in a matter of seconds. It requires no power connections and weighs just a few pounds. A slight conversion changes the tool into a driver unit that can be used for other maintenance jobs.

It is clamped on the signal pipe at the point where the pin is to be driven through pipe and plug. An integral pin and cartridge assembly is placed in the barrel and a firing unit attached. The spring-actuated safety arm is turned 180 degrees from its normal position and held there. In this position the handle of the pinner is pushed forward sharply and the cartridge is fired. The high gas pressure produced by the fired cartridge exerts a controlled force of thousands of pounds upon the pin, driving it instantaneously through pipe and plug.

In every case, this tool can drive the pin within ½-inch of and diametrically opposite to the present rivet.

## Silica Detection Speeded

A faster, more accurate method for detecting the size and quantity of silica in dust was demonstrated at the 12th annual Industrial Health Conference in Atlantic City, N. J. Germain Crossmon, biological and chemical microscopist at Bausch & Lomb Optical Co., Rochester, N. Y., demonstrated the technique which should prove valuable in the prevention of silicosis and other diseases of the lungs.

Under his method which he calls dispersion straining, a dust sample is placed on a glass slide, and a drop or two of a liquid having the same refractive index as free silica, is added. The preparation is then ex-

A
B
C
Free end of chain A is run around load, through body of Automatic Lock B then linked into lifting grab hook. Fork C locks automatically when slack of chain is taken up.

*upper* • Neat design, positive grip means safe, sure bundle handling.

*lower* • Bundles in storage yard ready to be picked up whenever needed.

# New AMERICAN
## BUNDLING CHAIN
## with Automatic Lock

A complete unit...ready to use. Eliminates links, shackles, pins, wires. Depending on the type of service and use, the drop-forged Automatic Lock can be furnished with 17/32", 9/16", 5/8", and 21/32" wrought iron, low carbon, high test, or alloy chain.

***Speeds Material Handling.*** Bundles can be made up quicker, handled faster and safer, and stored indefinitely without loosening. Bundle is opened by flipping locking fork back by hand while load is suspended. When bundle is set down, chain runs back through lock body.

*Write today for Bulletin DH-266 on the ACCO Bundling Chain with drop-forged Automatic Lock (Patent Pending).*

ACCO

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*In Business for Your Safety*

WESTINGHOUSE
Life-Linestarter
RESET
DO NOT LUBRICATE
Life-Linestarter
PAIRED FOR PRODUCTION
Life-Line motor

# STOP costly down time with this pair

"Down-time minutes" can mean a loss of hundreds of units or thousands of dollars. Here's a production team—the best defense against down time—Life-Line motors and Life-Linestarters®. They're paired for production.

Advanced design of these two has eliminated common troubles. Look at the features that make it possible:

**Life-Line motor**

*Steel frame*... adds strength, cuts weight.

*Pre-lubricated bearings*... no greasing.

*Improved windings*... protected by tough Thermoset varnish, add electrical life.

**Life-Linestarter**

*Bimetallic disc*... calibration unaffected by aging or oxidation.

*Servicing is simple*... all parts front removable.

Screw driver only tool required.

Get these two dependable performers—paired for production—and stop costly down time. For complete information, ask your Westinghouse representative for "Life-Line Motor Book", B-3842 and "Tomorrow's Starter Today", B-4677, or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21639

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A-1022

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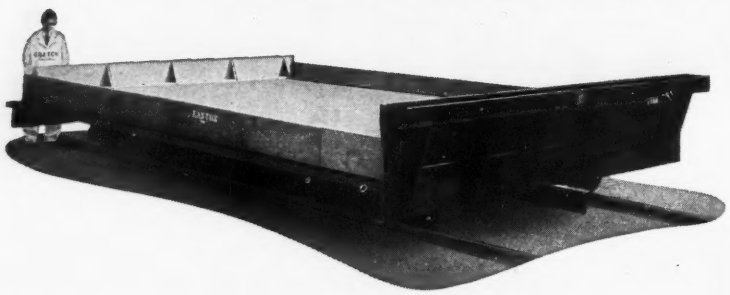
design and construction service
in industrial cars



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"New Process"
Punches • Dies • Rivet Sets
Compression Riveter Dies
Made from high-grade alloy tool steels properly heat-treated, of uniform high quality—may be purchased with complete confidence for maximum service.
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amined with either a dark-field or phase contrast microscope employing polarized or unpolarized light.

Using unpolarized light, the silica articles appear to be stained largely with a blue dye, with a tinge of red. Under polarized light, the silica particles appear either predominately blue or predominately red. Since the particles are easily identified by their color in either case, they can be readily measured as to size and quantity.

## Faster Draws for Farm Goods

Production of drawn sheetmetal parts for harvesters, combines and other farm machinery equipment was sizeably increased at the plant of one of the country's large farm machinery manufacturers, with the purchase of two 400-ton Blankholder presses manufactured by Hydraulic Press Mfg. Co., Mt. Gilead, O. Installed in Massey-Harris' Racine, Wis., plant, the 400-ton presses boast a pressing surface of 96 x 60 inches, and are equipped with 150-ton Blankholders and 100-ton die cushions. The

## Shaking Means Better Products

VIBRATION testing machine is used to test fire extinguishing system components by Walter Kidde & Co., at its Belleville, N. J., plant to determine how the systems will stand up under rough treatment after installation. The photograph shows a sphere containing CB, the fire extinguishing agent for many military aircraft, mounted on the tester in a position similar to the most severe mounting likely to be encountered in service. Resonant frequencies of the sphere are determined by varying the frequency of applied vibration slowly through a wide range of frequencies and forces. Test engineer adjusts the stroboscope so that its light beam pulsates in phase with the sphere's vibration and any distortions or failures taking place can be observed

# LEWIS

## Rolling Mill Equipment ... meets rolling requirements

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You can lighten the load on materials, machines, and men in your shop by taking advantage of the data in Kennametal Performance Reports.

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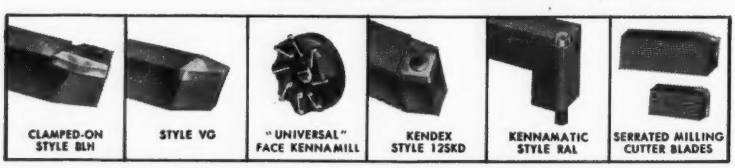
MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY





presses utilize a 42-inch stroke with a daylight of 78 inches, and feature the "fastraverse" hydraulic power system.

## Power Plants Readied for Cats

Two industrial diesel engines, the D337 and D326, are scheduled for production sometime midyear, by Caterpillar Tractor Co., Peoria, Ill. The six-cylinder D337 engine is an industrial version of the 5⅛ x 6-inch engine developed as a power source for the DW20 and DW21 tractors. The D326, although quite similar in design, will be offered with a lower horsepower range. One new feature on the two models is the fuel system with fuel pumps mounted adjacent to the cylinders they serve. This results in standard, identical, short fuel lines for each cylinder.

Oil cooled pistons have long been standard on Cat engines, but a new arrangement has been used on the D337 and 326. The pistons, which have an iron band cast integrally for the upper ring, are cooled by an oil stream sprayed from a nozzle that is solidly attached to the engine block. Since this spray lubricates the piston pin, as well as cooling the piston, oil grooves are not required in the connecting rod.

For the first time on a production engine, Caterpillar is incorporating fine filtration elements which handle the full flow of oil to the engine system. Most important is that oil passageways are protected from dirt and foreign material falling into them while filter elements are being changed and the fact that any sludge will collect at the bottom of the cams where it cannot possibly enter the oil passageways or relief valves.

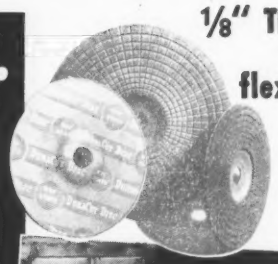
## Drill Press Standard Approved

Approval of a new American standard for drill drivers, split-sleeve, collet-type, is announced by the American Standards Association, New York. This type of driver is used in the automotive and mass production industries to drive straightshank twist drills. It is particularly suitable for these industry groups because multiple-spindle drill heads can be designed with spindles on a very close center-to-center distance and bushing plates do not have to be moved when drills must be replaced. The assembly of drill and collet-type driver necessitates manufacture to close tolerances. The new standard insures collets will fit drill shanks manufactured according to the standard for twist drills, straight shank and taper shank.

It covers drill drivers in nominal

# New... DuraCut Abrasive Discs

1/8" THICK yet flexible



*Blending weld on stainless steel tank.*

*Smoothing weld bead.*

## IF YOU'RE LOOKING for a BETTER WAY...

. . . to blend welds and similar jobs, at a lower cost with greater productivity, investigate the vast possibilities of DuraCut Abrasive Discs. These new multiple layer abrasive discs, are *flexible, strong, safe,* offering many advantages over the ordinary single layer type of coated discs.

- MAXIMUM FREEDOM OF CHIP DISPOSAL (segment patterned)
- INCREASED LABOR SAVINGS (less disc changing)
- FASTER, SUSTAINED RATE OF CUT (built to grinding wheel specifications)
- 10-25 TIMES LONGER LIFE (over 1/4 million more cutting particles)
- WITHSTAND LONG CONTINUED FLEXING (extra matted reinforcing)

*Removing rust and scale.*

*Removing weld spatters.*

*The only really flexible grinding wheel ever offered!*

**Order Today for a Trial:**

Sizes available for immediate shipment
7 x 1/8 x 7/8 } In any of these
9 x 1/8 x 7/8 } grit sizes: 36, 54, 80

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*Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh*
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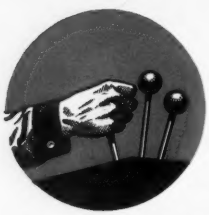
*in Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario*



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*High power ability* does it . . . the instant surge of power you get in a battery-electric truck that's Exide-Ironclad equipped. And it's finger-tip-control power . . . meets *all* demands in *stop-and-go, lift-and-shift* operations . . . plus split-second handling, easy maneuvering, accurate spotting. Exide-Ironclad Batteries also give you:

**ROUND-THE-CLOCK PERFORMANCE**—no mechanical troubles, no unscheduled down time.

**UNIFORM SPEED** straight through to end of shift.

**LOW OPERATING COSTS**—on the average of 4c an hour for power . . . batteries absorb a very high percentage of charging current.

**LOW MAINTENANCE COSTS**—seldom more than 15 cents per shift.

**EXCEPTIONALLY LONG LIFE**—proved on more than 100,000 heavy-duty jobs.

**INHERENT SAFETY**—freedom from the hazards of fire, fumes, noise and uncleanliness.

There are Exide-Ironclad Batteries for every size and make of battery electric truck.

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*1888 . . . DEPENDABLE BATTERIES FOR 63 YEARS . . . 1951*

sizes from 0.0390 to 0.6875-inch inclusive. It specifies dimensions controlling the assembly of the driver with straight shank drills; and the taper controlling the assembly of the driver with the drill press. It also contains recommendations for the material to be used, its heat treatment, Rockwell hardness finish and marking.

A committee organized under ASA procedure and jointly sponsored by the American Society of Mechanical Engineers; the Metal Cutting Tool Institute; National Machine Tool Builders' Association; and the Society of Automotive Engineers developed this standard.

## Research Cuts Critical Metals

Turbojet engines made entirely from materials available in the Western Hemisphere are being produced by Pratt & Whitney Aircraft, William P. Gwinn, general manager, announces. Dependence on metal imports from Asia, Europe and Africa is completely eliminated in production on the J-48 Turbo-Wasp, the most powerful jet engine now being delivered to the U. S. Air Force and Navy.

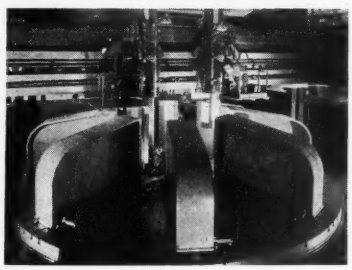
As a result of an intensive three year research and engineering campaign to eliminate the use of critically scarce metals, the J-48 now uses less critical metal per pound of engine thrust output than any other engine in production in the United States. This has been accomplished without any sacrifice in the performance or durability of the engine.

The three most critical materials in jet engine production are columbium, cobalt and tungsten. Nigeria is the sole source of columbium while only small deposits of tungsten and cobalt are available in North and South America. Columbium is eliminated while tungsten and cobalt are reduced to a small trace of a fraction of a pound per engine—well within the capabilities of Western Hemisphere supply sources.

Production of jet engines at one time was expected to be the chief bottleneck in America's rearmament program. It was feared that this country lacked sufficient domestic supplies of certain essential minerals which are required as alloying materials to yield the heat-resisting metals necessary for gas turbine engines. In the event of a national emergency, there is the possibility that foreign sources of these materials would be cut off.

The government did what it could to ease the situation. The Munitions Board has been stockpiling key imported metals likely to run short. The Interior Department has encour-

## Big Bore Handled Easily



RADIAL arms of the upper bearing and thrust bearing support for an 82,500-kva, 100 per cent power factor, 180 rpm, suspended-type vertical synchronous generator for Hoover Dam are readily handled by a 40-foot boring mill in Allis-Chalmers Mfg. Co.'s shops in Milwaukee. Generator is one of two to be driven by a 115,000-hp 480-foot head hydraulic turbines. These turbines are duplicates of seven previous units built by the company for this same installation except that spiral casing sections are welded steel plate instead of cast steel as in the original units

EXAMPLE FROM PRESKRAFT PRODUCTION
•
105mm SHELL CONTAINER

*Preskraft Service includes...*

- PROJECTION, SPOT AND ARC WELDING
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**These 105mm Shell Containers, 37" long, were produced in large quantities... *Complete by Cuyahoga*... for U.S. Army Ordnance during World War II. The engineering and plant facilities which enabled us to successfully fulfill this and other prime contracts are at your service. We will be pleased to cooperate with you on your war work sub-contracts as well as on your regular civilian production. Call us, without obligation, for consultation. You'll find Cuyahoga Preskraft is A Complete Service that you can use...a dependable source from the blueprints to the finished product, packaged and shipped to your order.**

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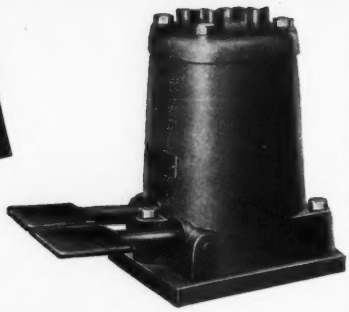
AIR AND HYDRAULIC
Control Valves



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Foot Valve

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**Increase output of hammers, shears, presses, etc.**

● Operators have both hands free to handle the work—speeding production. Valving mechanism has stainless steel body and push-pull rods, brass sleeves, self-sealing U-packers and many other refinements, all fully enclosed against dirt, assuring long efficient trouble-free operation. Convenient pipe connections. No metal to metal seating. ⅜" to 1" sizes, 3-way and 4-way, neutral position and regular actions. *Write for full details.*

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*Hand, Foot, Cam, Pilot, Diaphragm and Solenoid Operated*

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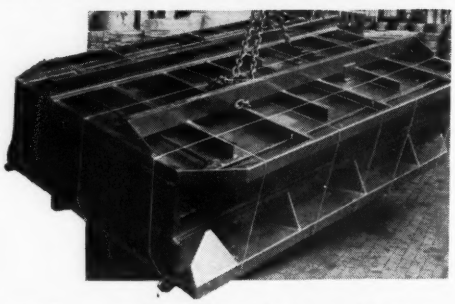
**GERRARD STEEL STRAPPING**

***cuts packing cost!***



● Shown here are truck bodies nested together and tied into a firm, rigid unit capable of withstanding the rigors of export shipment. Gerrard Steel Strapping made a strong, tight tie, eliminated the need for wooden crates, and saved the time, labor and expense of crating.

Investigation of the Gerrard Method of Strapping might help you cut packing costs and speed up tying operations in your plant. Whether you ship small parcel post packages, heavy pallets of machinery, or carload lots of steel pipe and plate, you will find a size of Gerrard Steel Strapping that will fit your needs. And you can be sure that every Gerrard-Strapped unit will remain firm and secure until it reaches its destination.

Gerrard Steel Strapping costs about 40% less than any other metal reinforcement. Get the full story about Gerrard Strapping Methods from a Gerrard engineer. His advice on tying problems is free. And write for a free copy of the *Blue Book of Packaging.*

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UNITED STATES STEEL

aged the development of domestic mineral deposits that would otherwise have been uneconomic to exploit. But the major effort has had to be made by the industries producing defense equipment, themselves, in redesigning their products wherever possible to reduce the amount of critical materials used.

## Cylinder Heads Move Rapidly

A machine tool that performs 90 different operations on 100 cylinder heads per hour has been delivered to a large automotive manufacturer by Cross Co., Detroit. Work is done at eight stations with part loading at the first.

At second station, six rocker arm bracket holes and one water jacket hole are drilled, and 16 stud holes are drilled to one-half of final depth. At station three, four of the stud holes are drilled to final depth, the rocker arm bracket holes are chamfered, two stud holes are reamed as locating holes, and three water jacket holes are drilled. At station four, two oil holes are drilled to one-half depth and the drilling on the remaining 12 stud holes is completed. At station five, nine stud bosses are spot-faced and 12 push rod holes are drilled one-half way. At station six, the two oil holes are drilled to final depth, the rocker arm bracket holes and the first water jacket hole are inspected automatically for depth, and the 12 push rod holes are drilled to final depth. At station seven, six rocker shaft bracket holes and one water jacket hole are tapped. At station eight, the completed cylinder head is unloaded. Part transfer is automatic from station to station.

## Precision Gear Tester Improved

An improved method for testing the critical lubrication requirements of high-speed precision gears is a development of the engineering department at Texas Co.'s Beacon, N. Y., laboratories. The test rig is based on a machine originally designed by Pratt & Whitney Aircraft for bench testing gears and lubricants. It incorporates design features which extend the speed and load range. The Texaco modification permits speeds up to 16,000 rpm under loads which are the equivalent of those loads present in operations where small gears transfer 5000 hp.

It opens the way for Texaco engineers to accumulate significant data in a new class of lubrications problems. These problems have arisen with the rapidly growing use of gas turbines in aircraft and railroad engines. Today in such engines, smaller

gears have to turn faster and at the same time carry greater loads than their larger, slower revolving predecessors.

The high-speed high-load gear tester was developed as a research tool for the study of the behavior of lubricants under operating conditions arising from the combination of higher speeds and higher loads. The lubrication data acquired from the machine is being used to develop Texaco lubricants which will promote the efficient operation of high-speed high-load gears.

The ideal lubricant must also satisfy the other lubrication requirements of the gas turbine in addition to the gear needs. Aircraft turbo-prop engines have the more complicated requirements inasmuch as the engines must be able to start with gears at minus 65° F and run at 200 to 300° F. At the subzero temperature the oil must flow as a liquid to lubricate the high-speed gears and at the higher extremes it must lubricate while acting as a coolant.

## Runway Lights Have New Design

Airport runway lights developed by Westinghouse Electric Corp., Pittsburgh, feature one-piece lenses that distribute light over 360 degrees. Easy maintenance is claimed for the new high-intensity light.

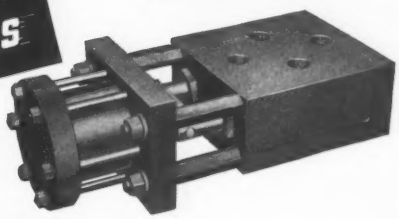
A breakable coupling parts if the unit is struck by vehicles thus minimizing possible damage to both the light and vehicle. High candlepower beam is projected up and down the

## Plant Begins Scraper Assembly

ASSEMBLY line operations are started at Caterpillar Tractor Co.'s Joliet, Ill., plant. Scrapers shown were assembled from parts supplied by the company's Peoria plant and nearby subcontractors. Because the structure is not completed, heat for the plant interior is provided by two railroad steam locomotives which pipe heat in from the outside. Full operations at the plant are not expected until January of next year


Quick-As-Wink AIR AND HYDRAULIC Control Valves

¾ Inch 4-Way — 5000 p.s.i. Piloted Hydraulic Valve



**PILOT OPERATED Hydraulic Valve**

**For hydraulic systems to 5000 p. s. i.**

● Designed for controlling double acting hydraulic cylinders. The pilot cylinder is controlled by any type of 4-way air valve and is operated either automatically or manually from a convenient control station. Machined steel housing, hard chrome plated ground and polished stainless steel plungers, molded packers sealed by valve pressure. All parts readily accessible without disturbing the piping. ½" to 4" sizes. *Write for full details.*

THE HIGHER THE PRESSURE THE TIGHTER THE SEAL

**Quick-As-Wink** AIR AND HYDRAULIC **Control Valves**

*Hand, Foot, Cam, Pilot, Diaphragm and Solenoid Operated*

*Mfd. by* **C. B. HUNT & SON, INC., 1924 East Pershing St., Salem, Ohio**

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***with BAD* Identification!***

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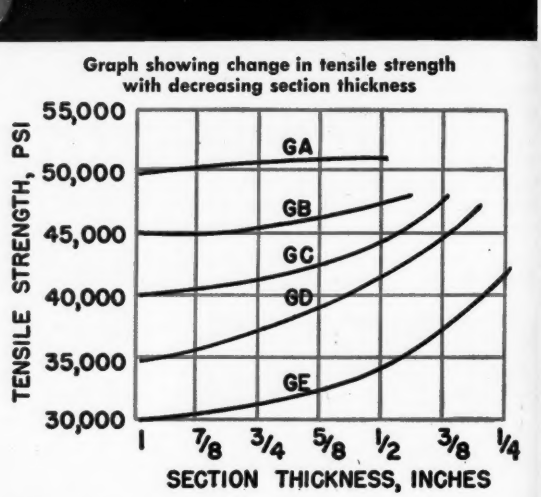
The group of small lightweight Meehanite castings illustrated are typical of both the variety and importance of thousands of similar small casting specifications regularly met by many Meehanite foundries. While giant, heavy weight castings are spectacular and, of course, important too, many a vital component of important equipment lies hidden;—those small parts weighing from a few ounces to a few pounds yet whose properties and qualities must be both exact and uniformly superior.

Meehanite castings large or small are manufactured using definite and established process controls. These controls permit the regular meeting of property specification such as strength, hardness, modulus of elasticity or resistance to wear, heat and corrosion, according to the combination of characteristics required.

These same property controls aid in the ability to minimize mass influence as revealed in the chart shown.

Graph showing change in tensile strength with decreasing section thickness

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Florence Pipe Foundry & Machine Co. ..... Florence, New Jersey
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Rosedale Foundry & Machine Co. ..... Pittsburgh, Pennsylvania
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Shenango-Penn Mold Co. ..... Dover, Ohio
Standard Foundry Co. ..... Worcester, Massachusetts
The Stearns-Roger Manufacturing Co. ..... Denver, Colorado
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Valley Iron Works, Inc. ..... St. Paul, Minnesota
Vulcan Foundry Co. ..... Oakland, California
Warren Foundry & Pipe Corporation ..... Phillipsburg, New Jersey

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runway while light in directions opposite the runway is patterned to advise pilots the direction and location of the landing apron. Announcement is made by the Westinghouse Lighting Division that the U. S. Air Force has placed an order for 4000 lamps.

## Air Pollution Analyzed

An instrument for use in analyzing air-pollution problems in highly industrialized areas has been developed by Battelle Institute, Columbus, O. Because it will tell the direction from which large quantities of dirt come, it is expected it will be useful to industries and municipalities in locating the sources of air-pollution nuisance. Known as a "directional dirt-fall collector," the instrument will provide an index of the general location of plants which may be responsible for heavy dirt fall.

The dirt-fall collector, will be made commercially available by Eberbach & Son Co., Ann Arbor, Mich. The device is designed to collect heavy dirt from any direction the wind is blowing. For a reliable indication of the sources of heavy contamination the instrument must be exposed for 30-day collection periods over many months in a carefully chosen location representative of a given area. The amounts of collected material must be correlated with data obtained from the Weather Bureau. A so-called "wind-rose pattern" shows the number of hours the wind has blown from the eight points of the compass. Knowing this, it is then possible to determine the relative amounts of dirt which have fallen per hour into the instrument from the various directions.

## Plowshares Welded Faster

Use of an eight-place rotary fixture has increased the production of welded plowshares by 10 per cent at Allis-Chalmers Mfg. Co.'s plant in LaCrosse, Wis. Parts are held in position and moved under a Unionmelt welding head at the proper speed. The plow consists of a die-cut gunnel and a forged share, which are welded together. One operator inserts these parts into the fixture and locks them in place with air clamps. The edge of the share meets the gunnel at an angle of 22 degrees and provides a welding vee. A capper bar backs up the joint so that a fully penetrated edge weld can be made.

As the table moves the assemblies beneath the welding head, granulated composition covers the welding zone. The weld is started at the moment when the edge of the assembly passes

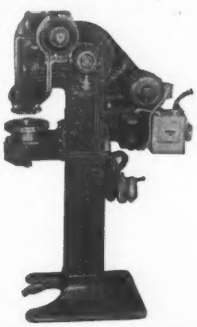

T-J SETS RIVETS and CLINCH NUTS Faster!

**T-J CLINCHOR** ... shown here is one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. These Clinchors feed and set 11/16" square cased nuts in outside quarter panels, left and right hand.



**TWIN RIVITOR** used for riveting flat steel springs to mounting brackets for automobile horns.

**T-J RIVITOR** used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.



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For *high production* ... T-J Rivitors! Automatically feed and set solid rivets. Set 1/16" to 1/4" diam. solid steel rivets up to 7/8" long using *electrically powered* Rivitor ... aluminum alloy rivets up to 1/4" diam. or steel rivets up to 1/8" diam. and up to 3/4" long, using *air powered* Rivitor. Throat depths, 8" to 36".

Speed up assembly in aircraft, farm machinery, automotive, stampings of all kinds ... with T-J dependability! Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Company, Jackson, Michigan.

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BRIDGEPORT BRASS COMPANY

# COPPER ALLOY BULLETIN

"Bridgeport" MILLS IN BRIDGEPORT, CONN. AND INDIANAPOLIS, IND.—IN CANADA: NORANDA COPPER AND BRASS LIMITED, MONTREAL

## Season Cracking Can Be Avoided By Cutting Down Internal Stresses

The fine art of drawing brass has been built up through many years of experience. Brass, while one of the easiest and most satisfactory metals to work with, is not without certain problems. These problems, fortunately, are avoidable by proper controls.

When drawing cups and shells, the percentage of reduction of both the outside diameter and the wall thickness should be carefully calculated: 1. in order to obtain the maximum reduction per operation, and 2. to prevent the introduction of dangerous internal stresses especially in the finished shell, stresses which may lead to season cracking when the article is kept in storage or during service use.

### Proper Drawing Practice to Prevent Severe Internal Stresses

To avoid danger of internal stresses, the general practice in the brass industry is to use fairly severe wall reductions on every operation, along with gradually decreasing reductions on the outside diameter. It is very important that the finish draw should be sure to include a substantial wall reduction in order to keep internal stresses to a minimum. If the final draw calls for a wall reduction of .002" or .003", care should be taken to make sure that die wear is not excessive. Otherwise, insufficient pinching of the wall will occur after long runs. The "Selection Chart for Deep-Drawing Dies", reproduced in the reprint of the Feb., 1950 issue of the Copper Alloy Bulletin, will be mailed on request.

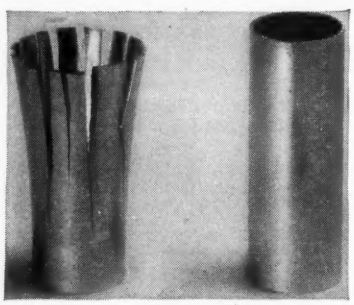
### Relief Anneal Helpful

If the final drawing of the shell without reducing the wall cannot be avoided and dangerous internal stresses are developed, the article should promptly be subjected to a relief anneal to reduce the stresses. Otherwise, it may fail in storage or when it is put to service. A relief annealing operation calls for heating the article at a temperature sufficiently high to reduce the stresses to a safe point, yet without bringing about softening of the hard drawn metal.

### Mercurous Nitrate Test

The usual method of determining the presence of internal stresses is the mercurous nitrate test. Here the article is immersed in a solution of mercurous nitrate for a period of 15 minutes. If no cracking occurs, it is assumed that no severe internal stresses are present. However, cracking within that period of immersion indicates the presence of internal stresses.

Strange to say, the dangerous internal stresses are not the result of excessive reduction of the metal. They are brought about by reducing the outside diameter without simultaneously thinning the wall. This operation is known as "sinking" when applied to tube drawing and actually thickens the wall.



Both tubes were "sunk" or drawn without a plug to induce stresses. Tube (left) was then annealed at the base only and tube (right) was annealed its entire length. After testing in mercurous nitrate solution, cracking revealed the presence of severe internal stresses that were present in the unannealed portion of the tube.

Often material which cracks in mercurous nitrate does not season crack after long years of service either because it is resistant to season cracking or because favorable atmospheric conditions exist. It must be remembered that when season cracking in service does take place, it is due to the combined action of ammonia, air and moisture on stressed material.

### Ammonia Prime Cause of Season Cracking

In recent years, the ammonia test is also used to determine the presence of dangerous stresses in hard worked brasses. However, ammonia tests are rather awkward to handle and much slower. The results must be interpreted with considerable caution. Consequently the ammonia test is not used as a standard method of control.

Micrograph illustrates cracking of stressed tubing after testing with ammonia, moisture and air.

It is often asked whether a nickel and chromium plate on a highly stressed shell is effective in preventing season cracking. There is no doubt that such a plate affords distinct protection. However, even the best plate shows some porosity and experience has shown that some stressed shells, even heavily nickel plated, have been subject to season cracking.

Yellow brass (66% copper, 34% zinc) is less resistant to season cracking than the higher copper alloys such as red brass (85% copper, 15% zinc) and commercial bronze (90% copper, 10% zinc). (6743)

## CAUSES OF CORROSION

*This article is one of a series of discussions by C. L. Bulow, corrosion metallurgist of the Bridgeport Brass Company.*

### Dezincification Corrosion (Cont'd)

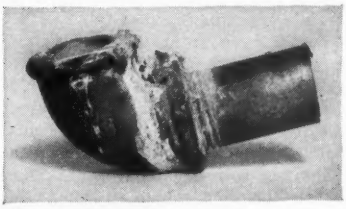
The rate of dezincification is not constant because of changing conditions. Careful microscopic examinations of cross-sections of areas of plug-type dezincification often show a series of bands similar to the growth rings in trees. This indicates that the rate of dezincification may not be constant, but rises and falls with the formation (polarization) and removal (de-polarization) of corrosion products which tend to stifle the reaction. Very often plug-type dezincification is arrested within months or years after it is initiated.

In the case of layer-type dezincification, where a large corroded area is involved, the corrosion rate is more gradual than that of plug-type dezincification. Evidently, this is due to the gradual increase in the surface area of the porous mass of copper, changing the ratio of corroded area versus the non-corroded area which favors more rapid de-polarization of the cathode in the copper/brass galvanic cell.

### Dezincification Not Always Fatal

In some cases where plug-type dezincification has perforated the wall of brass pipe, minute quantities of water may ooze through the porous plug of copper. The water may evaporate leaving a deposit of mineral matter in the form of a stalactite on the underside of pipes which are installed in a horizontal position.

In most instances if these nodules or stalactites are not disturbed, the leaking may stop with the pipe continuing to give service for many years. Here dezincification may not be too troublesome. The seriousness depends upon the functions of the brass part and the depth and extent of dezincification.



Illustrates failure of pipe from crevice corrosion at the threaded section. The pipe which had been fitted vertically to the elbow broke in service.

If the dezincification occurs in a part that functions mechanically, the weakened member may fail. Dezincification is most troublesome when it occurs in the crevices formed in threaded sections because the strength of the thread is lost. A crevice can be a site for localized corrosion in the same manner as a deposit. In a non-inhibited brass, this takes the form of dezincification. In other materials other forms of corrosion may occur. Localized corrosion at the threads has been combatted through the use of "dope" or sometimes solder. The use of soldered or brazed joints in copper tubing very effectively prevents crevice corrosion in water and in many chemical services.

Illustration shows selective corrosion at the threaded section.

## NEW DEVELOPMENTS

*This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.*

**Portable Hardness Tester** can be used to provide direct readings on practically any size or shape of metal, including curved areas of greater than 3/32" radius. Instrument will give Brinell readings, diamond pyramid, Rockwell or tons tensile readings. Scale of standard tool is 100-440 Brinell, low range is 50-260 Brinell and high range is 25-65 Rockwell. Device measures 3" high by 2½" in diameter. **No. 1143**

**Nibbling Machine** produces intricate shapes of ferrous and non-ferrous metals. Work can be fed in any direction, since rapidly moving circular punch operates over circular die. Five models are available, with throat depths ranging from 24" to 36". All models have two-speed drive and variable stroke. **No. 1144**

**Precision Control Valves** are suitable for air, water or oil control, with maximum pressure to 250 psi, and maximum temperatures of 250°F. Three sizes—¼", ⅜" and ½"—are available. All feature micrometer graduations for precision speed control of low pressure cylinders. They may be mounted in any position. **No. 1145**

**Air Operated Sander** has straight-line action. The single pad sander is said to leave no swirls or pressure marks. Operating either wet or dry, the unit is suitable for removing grinder marks, feather-edging, scuffing old paint, wet or dry sanding primer coat and lacquer color coat sanding. It can be used equally well on flat or curved surfaces. **No. 1146**

**Portable Stroboscope** is said to be capable of extreme accuracy in indicating synchronous speeds of motors, time switches, timing devices, etc. for both production and laboratory work. It makes use of an electronic cold cathode triode tube which rectifies the line source and gives off a pulse of light only during the positive portion of the a-c cycle to stop the motion of equipment operating in synchronism with the line frequency. **No. 1147**

**Drill Jig** requires but one bushing plate to accommodate up to 11/32" drill size. Set-up time is reportedly reduced, since one double-end anvil handles work stock diameters from ⅛" to ¾". Jig can be operated manually or automatically when actuated by drill press spindle. Lock-release rod is furnished for automatic operation. **No. 1148**

**Plier-Type Toggle Clamp** is said to be suitable for sheet metal work in assembly and for holding metal, wood or plastic parts during machining, welding and cementing operations. Overall length of clamp is 4½", weight is 5 oz. Handles and jaws are forged high-alloy steel, while bearing pins are stainless steel. **No. 1149**

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beneath the welding rod by a momentary discharge of high-frequency power which provides a path to initiate the flow of welding current. With the welding action established, the voltage control takes over and automatically governs further operation. Welding current is 500 amp at 35 v ac.

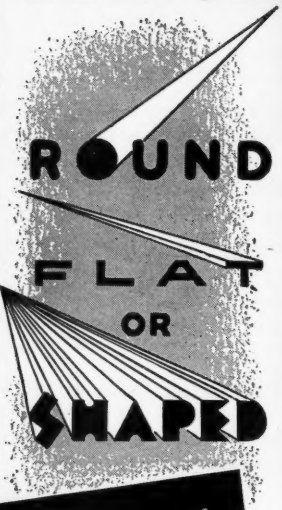
As the share moves past the welding head, a vacuum unit recovers the unfused welding composition and returns it to the hopper for re-use. A second operator then removes the welded shares from the fixture. If the fused welding composition were allowed to cool completely, it would snap off by itself. In this high speed fixture, the fused composition cools sufficiently so that a little tap with a hammer causes it to drop off. This reveals the weld, which is so smooth and clean that no chipping or grinding is required.

One fundamental problem in the design of this fixture was caused by the fact that the share moves in a circle beneath the welding head, while the joint to be welded is a straight line. The fixture had to be designed to move the welding head also, so that the combined motions result in a straight-line weld. The problem was solved by using an eight-faced cam which causes the welding head to swing in and out. With one man to load the fixture and another to unload it, production of the machine average from 60 to 65 completely welded plowshares per hour.

## Gages Cost $10,000 a Pound

PRECISION master gages weighing about a pound but worth over $10,000 are carefully examined by two tool room supervisors at the General Electric Co.'s Turbine Division, Schenectady, N. Y. The gages are used to check accuracy of production line gages and play a vital part in accuracy control during production of nozzles for steam turbines


# PAGE WIRE

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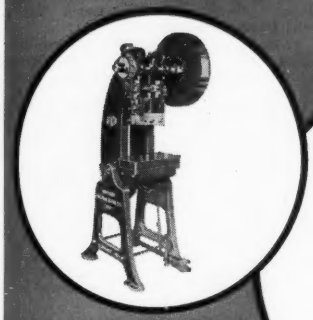

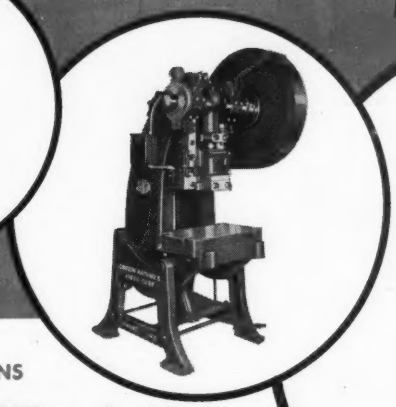

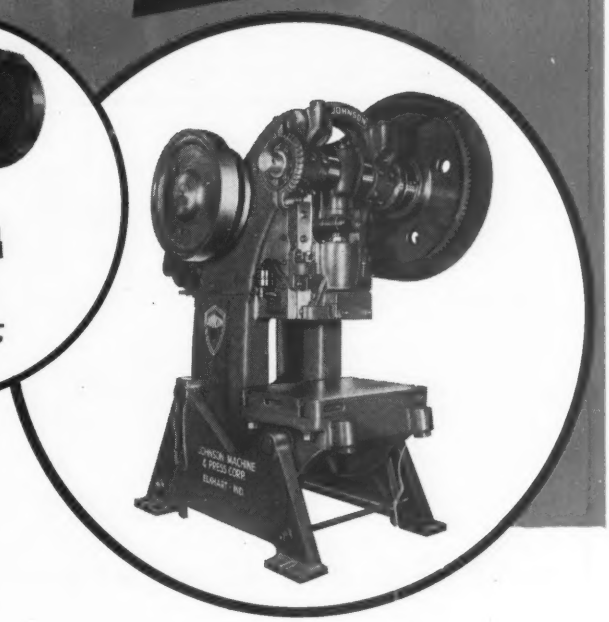

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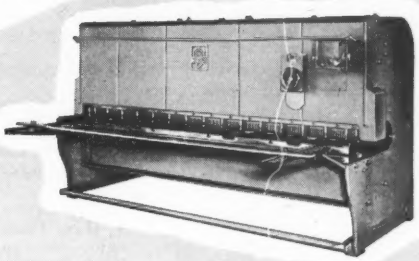

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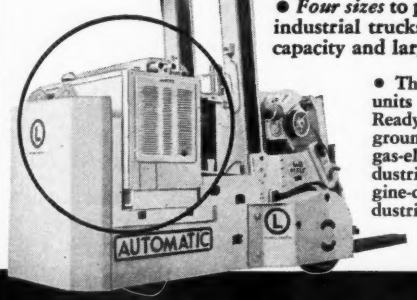


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# CALENDAR
## OF MEETINGS

*† Denotes first listing in this column.*

**May 14-16, Industrial Furnace Manufacturers Association:** Annual meeting, The Homestead, Hot Springs, Va. Association address: 420 Lexington Avenue, New York 17.

**May 14-17, American Mining Congress:** Coal convention & exposition, Public Auditorium, Cleveland. Congress address: Ring Bldg., Washington 6.

**May 16-18, Society for Experimental Stress Analysis:** Spring meeting, National Bureau of Standards & Wardman Park Hotel, Washington. Meeting address: David Taylor Model Basin, Washington 7.

**May 17-18, Lead Industries Association:** Annual meeting, Biltmore Hotel, New York. Association address: 420 Lexington Ave., New York 17.

**May 17-18, The Wire Association:** Regional meeting, Henry Grady Hotel, Atlanta. Association address: 300 Main St., Stamford, Conn.

**†May 20-21, Industrial Truck Association:** Spring meeting, The Greenbrier, White Sulphur Springs, W. Va. Association address: 3701 N. Broad St., Philadelphia 40.

**May 20-23, Caster & Floor Truck Manufacturers Association:** Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association address: 7 W. Madison St., Chicago 2.

**May 21-22, American Zinc Institute:** Annual meeting, Hotel Statler, St. Louis. Institute address: 60 E. 42nd St., New York 17.

**May 21-22, Rail Steel Bar Association:** Spring meeting, Edgewater Beach Hotel, Chicago. Association address: 38 S. Dearborn St., Chicago 3.

**†May 21-23, International Acetylene Association:** Annual convention, Hotel Windsor, Windsor, Canada. Association address: 30 E. 42nd St., New York 17.

**May 22, Open Steel Flooring Institute,** Spring meeting, William Penn Hotel, Pittsburgh. Institute address: 2311 First National Bank Bldg., Pittsburgh 22.

**May 23-24, American Iron & Steel Institute:** General meeting, Waldorf-Astoria, New York. Institute address: 350 Fifth Ave., New York 1.

**May 23-24, American Society for Quality Control:** National convention, Public Auditorium and Hotel Cleveland, Cleveland. Society address: 22 E. 40th St., New York 16.

**May 24-25, Anti-Friction Bearing Manufacturers Association Inc.:** Spring meeting, Edgewater Beach Hotel, Chicago. Association address: 60 E. 42nd St., New York 17.

**†May 24-25, Society of the Plastic Industry Inc.:** Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Society address: 67 W. 44th St., New York 18.

**May 28-30, Metal Treating Institute:** Spring meeting, Hotel Colprado, Glenwood Springs, Colo. Institute address: 271 North Ave., New Rochelle, N. Y.

**May 28-31, Grinding Wheel Institute:** Spring meeting, The Homestead, Hot Springs, Va. Institute address: Greendale, Mass.

**May 28-June 6, World Petroleum Congress:** The Hague, Netherlands.

**May 28-June 8, Canadian International Trade Fair:** Exhibition Grounds, Toronto, Ont.

**June 4-6, American Gear Manufacturers Association:** Annual meeting, The Homestead, Hot Springs, Va. Association address: 302 Empire Bldg., Pittsburgh 22.

**June 6-8, The Aluminum Association:** Spring meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association address: 420 Lexington Ave., New York 17.

**June 10-13 & 13-16, National Metal Trades Association:** Annual western plant management conferences, Dell View Hotel, Lake Delton, Wis. Association address: 122 S. Michigan Ave., Chicago 3.

**June 11-13, American Supply & Machinery Manufacturers Association Inc.:** Industrial supply convention, San Francisco. Association address: 1346 Connecticut Ave. N. W., Washington 6.

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As a drawing brass in the form of sheet or strip, Formbrite is stronger, harder and more resistant to scratching and abrasion—yet so ductile that it readily withstands deep-drawing operations.

In the form of rod and wire, Formbrite has about the same strength as regular cold heading wire—with good ductility. It is ideal for rivets, wood and machine screws and upset products generally. A minimum tumble cleans and polishes Formbrite fastenings.

Formbrite is beyond the experimental stage. Millions of pounds have been made, sold and satisfactorily fabricated and finished. It costs no more than standard drawing or cold heading brass. If you are cold-working brass in the form of sheet, strip or wire, you will want to know more about Formbrite. Write for Publication B-39 . . . and if you'd like to compare Formbrite with ordinary drawing brass in your own polishing room, ask for the kit of two sample cups. The American Brass Company, General Offices, Waterbury 20, Conn.

5186

*Formbrite is a trademark of The American Brass Company designating copper-base alloys of exceptionally fine grain, combining unusual polishing characteristics with good strength and hardness, plus excellent ductility.*

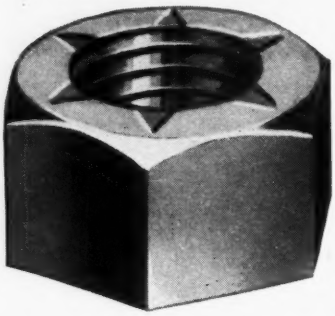
*the name to remember in*

**COPPER · BRASS · BRONZE**

# GRIPCO LOCK NUTS

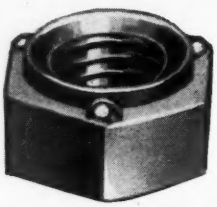
PUSH PRODUCTION UP

Made to lock on bolts of varying tolerances —start on the Bolt easy, just like a common



nut. When the "double triangle" deflected Nut Threads (patented) engage the Bolt Threads, they make a secure "union", a "couple" that can only be "divorced" by a "wrench".

*Locks wherever it stops.* Its sustained holding power is unaffected by vibration, oil, water or chemicals. Can be removed and reapplied many times without appreciable loss of locking efficiency. *Available in Steel or Brass.* Made to fit National fine or National coarse thread bolts.



PUSH COSTS DOWN

## GRIPCO PILOT-PROJECTION WELD NUTS

Save time and trouble. The circular Pilot centers the Gripco Weld Nut instantly, right over the bolt hole, for quick, accurate welding. No measuring. No jigs. No time wasted. Gripco Weld Nuts are available with standard threads or with Gripco Lock threads, and with two Pilot heights to fit different thicknesses of metal.

Samples and prices on both *Gripco Lock Nuts* and *Gripco Pilot-Projection Weld Nuts* will be sent promptly on request. Specify type of thread as well as sizes of nuts.

GRIP NUT COMPANY

308-N SO. MICHIGAN AVE., CHICAGO 4, ILL.

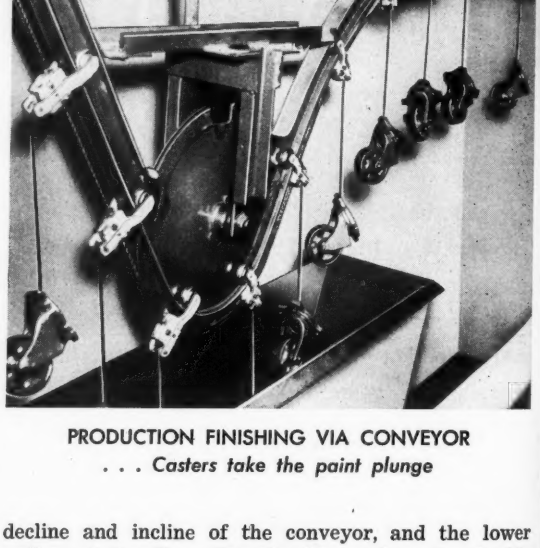
R-5354


# Conveyor Quick Dip Saves Space, Paint

INTRAPLANT movement of materials during the various stages of manufacture and processing sometimes represents the major item of the total cost of the finished article. Overhead cable conveyors are simple, flexible materials handling devices for fast, profitable finishing of small parts. For dip painting or spray finishing light parts the compact lightweight cable trolley conveyor is widely used.

Continuous production in automatically coating small parts by dip painting frequently calls for a quick dip in the conveyor line. A short vertical curve made by an overhead trolley wheel type conveyor is the 9½-inch radius vertical dip of the universal cable conveyor that is manufactured by E. W. Buschman Co., Cincinnati.

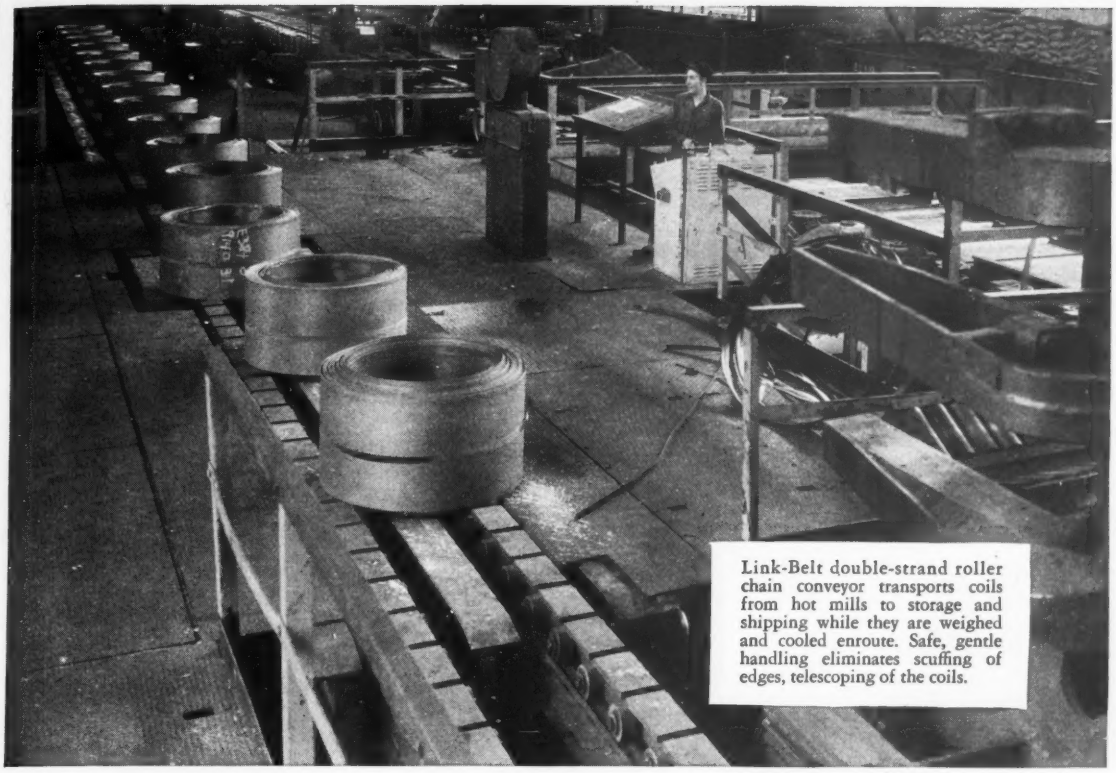
Size of the dip tank depends upon sharpness of decline and incline of the conveyor, and the lower radius of the dip. Considerable saving of valuable space by decreased tank dimensions and corresponding reduction in the amount of paint or liquid in tank are both important advantages to cost-conscious manufacturers.



PRODUCTION FINISHING VIA CONVEYOR
*. . . Casters take the paint plunge*

In the accompanying illustration industrial type casters are shown as they enter a 4½-foot dip tank for full immersion on universal conveyor quick dip at the Albion, Mich., plant of Albion Industries Inc. Fabricated at the factory, this standard 9½-inch radius quick dip is easily erected without requiring any welding.

Parts up to 10 x 18-inch spaced at 24-inch intervals are dipped in the 4½-foot tank. The power-driven overhead universal trolley conveyor is specifically designed for light and medium loads.



Link-Belt double-strand roller chain conveyor transports coils from hot mills to storage and shipping while they are weighed and cooled enroute. Safe, gentle handling eliminates scuffing of edges, telescoping of the coils.

# MOVE up to 75,000 lb. COILS . . .

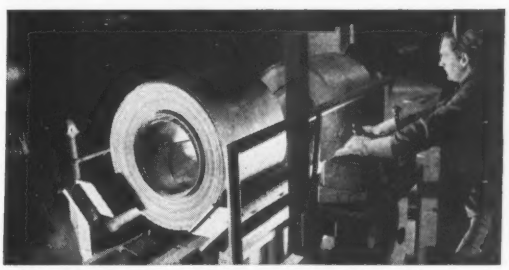
## and get less scrap loss, greater safety

### Yield goes up . . . waste goes down . . . with LINK-BELT Coil Handling Equipment

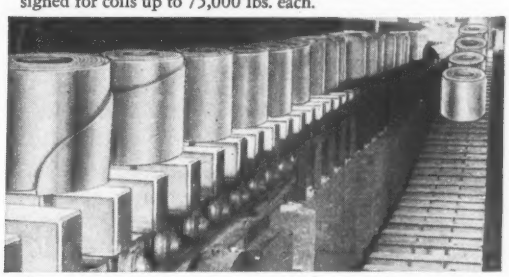
EVER-increasing rolling mill capacity and the trend toward larger coils require heavier conveyor systems capable of handling greater tonnages.

Since the inception of the continuous strip mill, Link-Belt has pioneered coil handling equipment. Now America's steel mills can choose from three basic Link-Belt conveyor types . . . designed to cover the complete range of operating needs.

Our engineers will work with your own engineers, consultants and builders of mill and process equipment. If you are contemplating expansion, it will pay you to call your nearest Link-Belt representative.



The above illustrates pickled coils up to 40,000 lbs. being lifted from Link-Belt Wide Pallet Conveyor and weighed automatically. Other conveyors for similar service are designed for coils up to 75,000 lbs. each.



Where numerous turns are required or cooling space is limited, Link-Belt Car-Type Conveyors are best. Coil never leaves its car. Without rolling or scuffing of edges, coils go around corners, up and down inclines.

LINK-BELT

THE SYMBOL OF QUALITY — LINK-BELT

**MATERIALS HANDLING, PROCESSING and POWER TRANSMISSION MACHINERY**

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Cleveland 15, Pittsburgh 13, Atlanta, Dallas 1, Houston 1, Minneapolis 5, San Francisco, 24, Los Angeles 33, Seattle 4, Toronto 8, Offices in principal cities. 12,417

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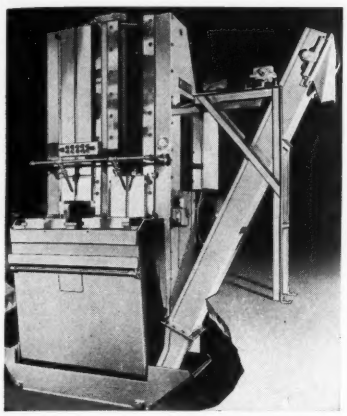
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

UNITED STATES STEEL

# New Products and Equipment

## Automatic Chip Conveyor

Two types XD 30 x 66-inch stroke double slide vertical surface broaching machines made by Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis., are equipped with automatic chip conveyors and are used to broach the sides and keyways on sides of track links. The chip conveyors are made by General Conveyors Corp., Van Dyke, Mich., and are



of the continuous type driven by a 1 hp, 1200 rpm electric motor and speed reducer. Conveyor chain is 13.8 fpm. Chips are carried to a hopper on the floor level.

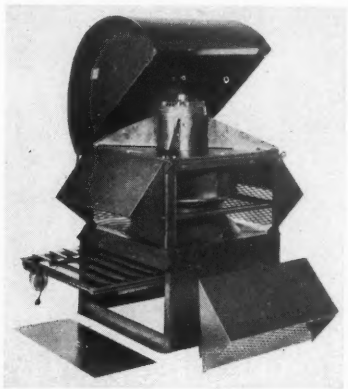
Centrally located machine control includes: Dual safety start buttons, a selector switch for manual, semi-automatic or full automatic operation, a hand lockout and pushbuttons for inching tables and slides and for starting and stopping conveyor, cutting fluid pump and two way variable deliver pump.

**Check No. 1 on Reply Card for more Details**

## Plant Cooler

A power roof ventilator type PRV consisting of a housed direct connected centrifugal fan and motor is offered by Ilg Electric Ventilating Co., 2850 Crawford Ave., Chicago, Ill. It is made in 11 sizes, each available in two to four different speeds. For extra quiet operation, low speeds are available in each of the 11 sizes. It provides air deliveries over the unusually large range of pressures from free air to 1½-inches of static pressure.

Suction pressure produced by the fan wheel, which is fitted with backplate fins, maintains a steady, low velocity, cooling air stream that passes through the motor compartment and motor. Unit's weather-tight housing contains the complete fan unit and air control accessories, eliminating the need of a high-profile curbing and fitting of air control accessories into the roof or curbing section. Features of the ventilator are: Leakproof roof, hinged on two sides for inspection and assembly; an air shield

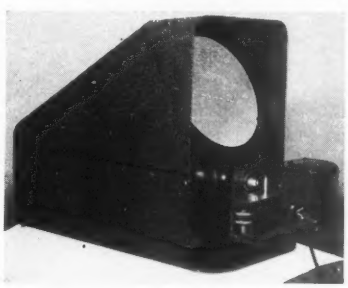


separating the motor compartment from the air stream; floated drive sound isolation; rain-proof air discharge louvers on all four sides; and a backward-curved type centrifugal fan wheel with non-overloading characteristics which protect the motor against overload under all conditions.

**Check No. 2 on Reply Card for more Details**

## Versatile Projector

A wide variety of jobs may be handled with the model P-5 optical projector made by Portman Instrument Co., 6 Manhasset Ave., Port Washington, N. Y. A stage working



area of 5 x 6½-inches, makes it possible to set up and check awkward shaped parts with simple ordinary clamps and blocks.

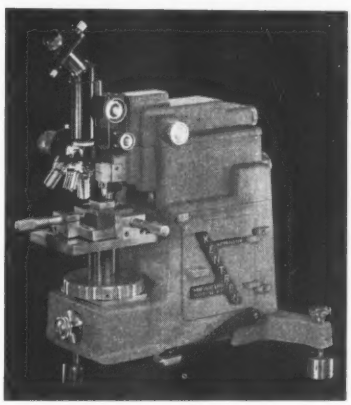
Screen size is 14½ inches in diameter and overall dimensions are: Length 45½ inches, width 18 inches, height 28 inches. A choice of 10X, 25X, 15X, 90X or 100X magnification lens unit may be had as original equipment with every projector.

**Check No. 3 on Reply Card for more Details**

## Testing Range Broadened

Kent Cliff Laboratories, Peekskill, N. Y., have made several major improvements in the Kentron micro hardness tester used for making Knoop or Vickers hardness tests on metals, fine wire, small precision parts, etc. Testing load range of the instrument is increased and now applies dead weight loads from 1 to 10,000 grams. Application of the dead weight loads is controlled by the precisely built up oil dash pot with preloaded operating mechanism to eliminate backlash.

Mechanical stage is designed so that the test specimen slides underneath high powered objectives up to and in-



cluding 1000X magnification without disturbing the original focusing of the microscope. Specimen always remains in focus from testing to viewing position.

**Check No. 4 on Reply Card for more Details**

## Transformer More Compact

Several improvements have been made in the CSP transformer manufactured by the Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Incorporated in all ratings, the improvements make the transformer simpler, smaller, and easier to ship and service. Two padlocks will now lock up four doors on front and the auxiliary compartment on the rear has been eliminated.

Potential transformers are of the drawout type to make fuse changing more convenient. The arrester bracket is welded to the tank on the high

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Polished Raceway surface magnified 100 times as used in other ball bearings.
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90% longer life
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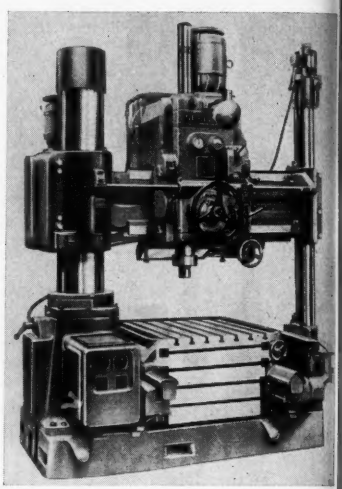
ANN ARBOR, MICHIGAN

voltage side to lower the profile. Removable frame formerly required for shipping has been eliminated by building the braces inside.

Check No. 5 on Reply Card for more Details

## Production Jig Borers

Production jig borers, types R-2 and R-3 made in Switzerland by Oerlikon Machine Tool Works for boring, drilling, reaming, tapping, screw cutting, facing and outside turning without jigs are being introduced in the U. S. by Cosa Corp., 400 Lexington Ave., New York 17, N. Y. These machines are designed so that the boring head, cross rail and smaller column can be locked rigidly in



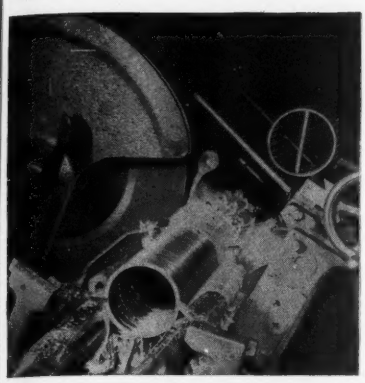
any position, making it possible to locate holes by the co-ordinate method using gage blocks or pins to a tolerance of 0.0004 to 0.0008-inch between centers and to drill holes as small as 0.040-inch in diameter.

Both models have 18 spindle speeds and 12 feeds. The R-2 has speeds from 38 to 1900 rpm and feeds from 0.0012 to 0.031-inch per revolution; the R-3 has speeds from 30 to 1500 rpm and feeds from 0.0012 to 0.0472-inch per revolution. Motor on the boring head of the R-2 is 6 hp and, on the R-3 is 7.5 hp.

Check No. 6 on Reply Card for more Details

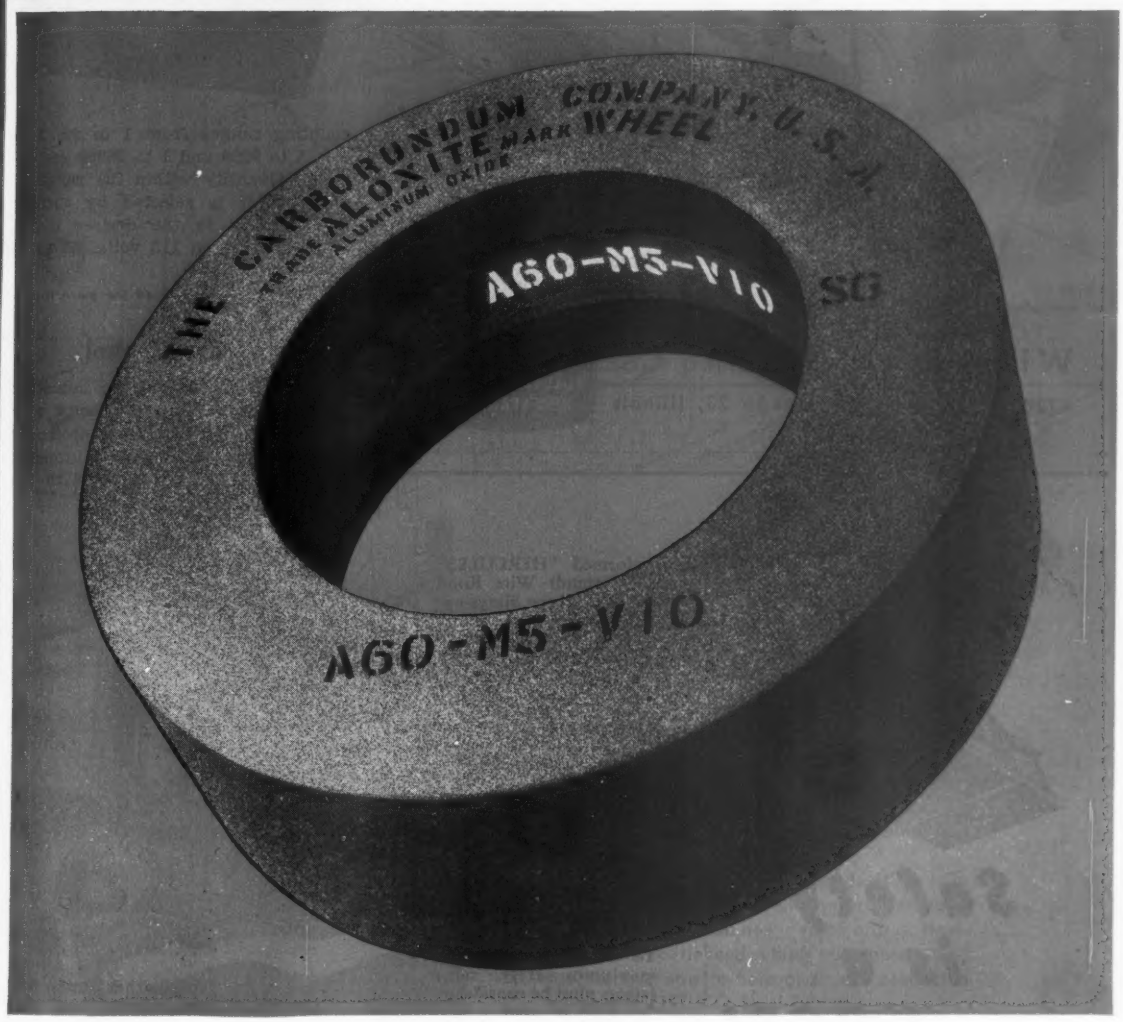
## Improved Batch Counter

Continuous automatic counting of preselected batch quantities at high speed without interrupting production is achieved by an improved automatic batch counter announced by the Production Instrument Co., 704-16 W. Jackson Blvd., Chicago 6, Ill. Monitor automatic batch counter operates a built in batch control switch at completion of each count and at the



# Improved Centerless Wheel Grinds RIGHT!

CARBORUNDUM's improved V10 Bond Grinding Wheels are engineered to maintain grinding efficiency with minimum contact pressure. Their continuous cool, free-cutting qualities produce dimensionally accurate work to required finishes... free from chatter marks, scoring, or burning. Ideally suited to heavy stock removal on both hard and soft materials, these wheels are being used increasingly in the entire range of centerless work, throughfeed and infeed. Your CARBORUNDUM representative will be glad to discuss proper gradings and applications in obtaining most effective results. Write Dept. S 81-20.

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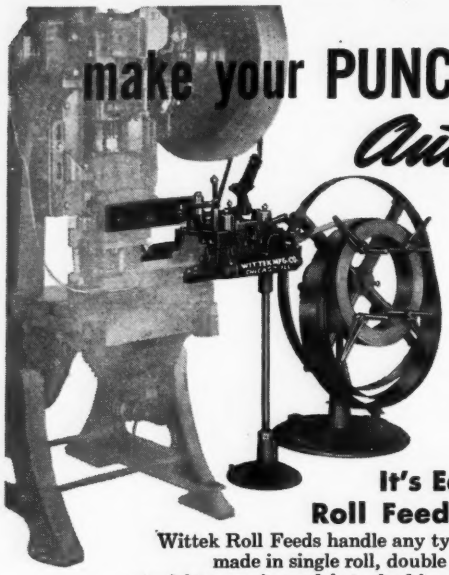

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**It's Easy...with WITTEK Roll Feeds and Reel Stands**

Wittek Roll Feeds handle any type of coiled strip stock and are made in single roll, double roll, and compound types with straighteners, in models to feed in any of four directions. They are reliable and accurate with simple, quick adjustment of feed length. Standard sizes and models meet a wide variety of press size and capacity conditions.

Wittek Reel Stands facilitate handling coiled stock.

*Write for full particulars

**WITTEK** Manufacturing Co.

4328 W. 24th Place, Chicago 23, Illinois

Automatic ROLL FEEDS AND REEL STANDS WMCo

Preformed "HERCULES" (Red-Strand) Wire Rope and Wire Rope Slings are designed and manufactured to meet the ever-present and all-important consideration—Safety.

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and
WIRE ROPE SLINGS
* REG. U.S. PAT. OFF.

*Safety is a MUST!*

To obtain and maintain maximum safety, many factors must be considered. We shall be glad to help solve *your* material handling problems. Write to our Engineering Department—without obligation, of course.

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**A. LESCHEN & SONS ROPE CO.** 5909 KENNERLY AVE. • ST. LOUIS, MO.

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same instant readjusts to start counting the next batch quantity.

It may be used to start or stop electrically operated machinery, conveyors, signals, chute gates, pile changers, etc. Counters are furnished in 2, 3, 4, and 5 digit models with

counting ranges from 1 to 99, 1 to 999, 1 to 9999 and 1 to 99999 respectively. Quantity within the range of the counter is selected by turning dial pointers to the desired digits. Unit operates on 115 volts, 25 to 60 cycles.

**Check No. 7 on Reply Card for more Details**

## Automotive-Type Control

A sitdown type electric industrial truck of 10,000-pound capacity with controls like those in an automobile has been designed by Automatic Transportation Co., 149 W. 87th St.,

Chicago, Ill. Three other units with capacity of 7000, 8000 and 9000 pounds are also being made available. The Skylift trucks are designated LFS-70, 80, 90, and 100.

The two larger models lift to 110 inches with a collapsed height of 83 inches. The LFS-70 and 80 are standardized for lift of either 115 or 119 inches according to the user's need, with collapsed height of the mast in either case being 83 inches. The larger models have an over-all

# Shape of things to come...

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*Tapering • Swaging • Flanging • Bending*
*Upsetting • Expanding • Reducing • Beading*
*End closing • Spinning • Drilling • Slotting*
*Notching • Flattening • Shaping • Trimming*
*Threading • Angle Cutting • And Many Others*

Products for the future take shape on the drawing boards of today. And scores of manufacturers are planning ahead for the time when emphasis will again be on production of consumer goods.

In shaping your products to meet tomorrow's demands, consider OSTUCO Steel Tubing. It offers so many outstanding advantages . . . so many unusual opportunities for design improvements, increasing strength while reducing weight, enhancing beauty, and lowering production costs.

Because of the continuing needs of the military services, we cannot always promise early delivery estimates on new civilian orders. However, our experienced tubing engineers are at your service now to help give your product a future with OSTUCO Steel Tubing.

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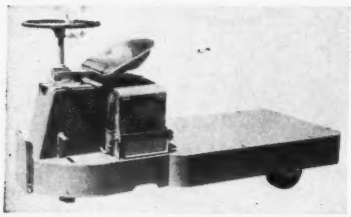
length of 93⅞ inches, plus forks; width of 48 inches at the broadest point; and single lift of 59 inches. They can right-angle stack in aisles measuring 106 inches plus load length and turn in intersecting aisles 80 inches wide.

**Check No. 8 on Reply Card for more Details**

## Handling Flexibility

A battery operated freight truck for use in plants as a pick-up or delivery truck is being manufactured



by the Market Forge Co., Everett, Mass. It is called the Load-Mobile, and features three-way operating positions which provide safety, comfort and maneuverability. Operator can sit facing away from the load, which is the normal position; face the load for narrow passages; or stand on the special step provided for easy access on and off the truck.

Truck is made in two models of 3000 and 5000-pound capacity. It travels at 3.5 to 4 miles per hour with no load. With full load the 3000-pound truck goes at 3 miles per hour and the 5000 model at 2.5 miles per hour.

**Check No. 9 on Reply Card for more Details**

## Temperature Accuracy

Simplytrol pyrometer controls with a large 4½-inch meter, made by Assembly Products Inc., Main at Bell St., Chagrin Falls, O., can be set to control temperature with ease and accuracy. Construction of the 4530 series is improved by panels and cabinets being made of heavier gage steel. Three point suspension prevents pulling cabinet out of shape when it is screwed down on an uneven surface. Plug in connections between the control and the terminal board make it easy to remove or replace without disturbing any of the permanent connections. Contact meter relays are readily intechangeable for different temperature ranges.

Unit may be used for automatic on and off control to maintain a preset temperature. It has a switch to change it from automatic to limit control. As a limit control it is a shut off device or safety warning unit which will make contact when a preset temperature is reached to sound an alarm or shut off a furnace. The 4540 series controls are similar to the 4530 units when they are used in limit position. The 4540 control is a shut off, or warning instrument which is reset manually.

**Check No. 10 on Reply Card for more Details**

## Improved Finishing Barrel

A feature of the improved Supersheen finishing barrel model DBO-1 is a removable screening drawer which facilitates separating parts from media, loading and unloading. The unit made by Almco, division of Queen Stove Works, Albert Lea,

Minn., is equipped with variable speed drive allowing from 25 to about 60 rpm.

Twin barrels measure 8 x 16 inches and are available with or without ¼-inch Neoprene lining. Construction is of heavy welded steel and all moving parts are enclosed within the safety hood. Unit is recommended for the processing of small lots of parts, processing of close tolerance work and for research and development work.

**Check No. 11 on Reply Card for more Details**

## Continuous Spot Welder

Continuous mash spot welding machine used for joining two ends of steel strip into one continuous length is a development of Universal Welder Corp., 735 Carnegie Ave., Cleveland 15, O. Degree of mash and speed of operation is controlled electronically. In operation the two matched ends are placed and clamped securely. Amount of overlap is predetermined but is generally less than ⅜-inch. From this point the welding machine is indexed across the strip, making stitch mash overlap welds to an approximate 70 to 80 per cent mash.

**Check No. 12 on Reply Card for more Details**

## Acetylene Plant

Sight Feed Generator Co., West Alexandria, O., has completed development of the model A-Twin continuous flow acetylene generator and is manufacturing complete acetylene compressing plants. These plants eliminate the need for gas holder since the generator is fully automatic and is capable of supplying the required pressure for forcing acetylene through piping and purifier to the compressor. Company will manufacture acetylene compressing plants in a wide range of sizes producing from 240 to 3000 cubic feet per hour.

**Check No. 13 on Reply Card for more Details**

## Rear Drive Truck

A one ton truck equipped for fast hauls of either short or long lengths is introduced by Gar-Bro Mfg. Co., Los Angeles, Calif. It has standard automotive drive and the three forward and the reverse speed are controlled by one gear shift lever. Driver sits in elevated rear seat facing the load and is able to effect safe turns

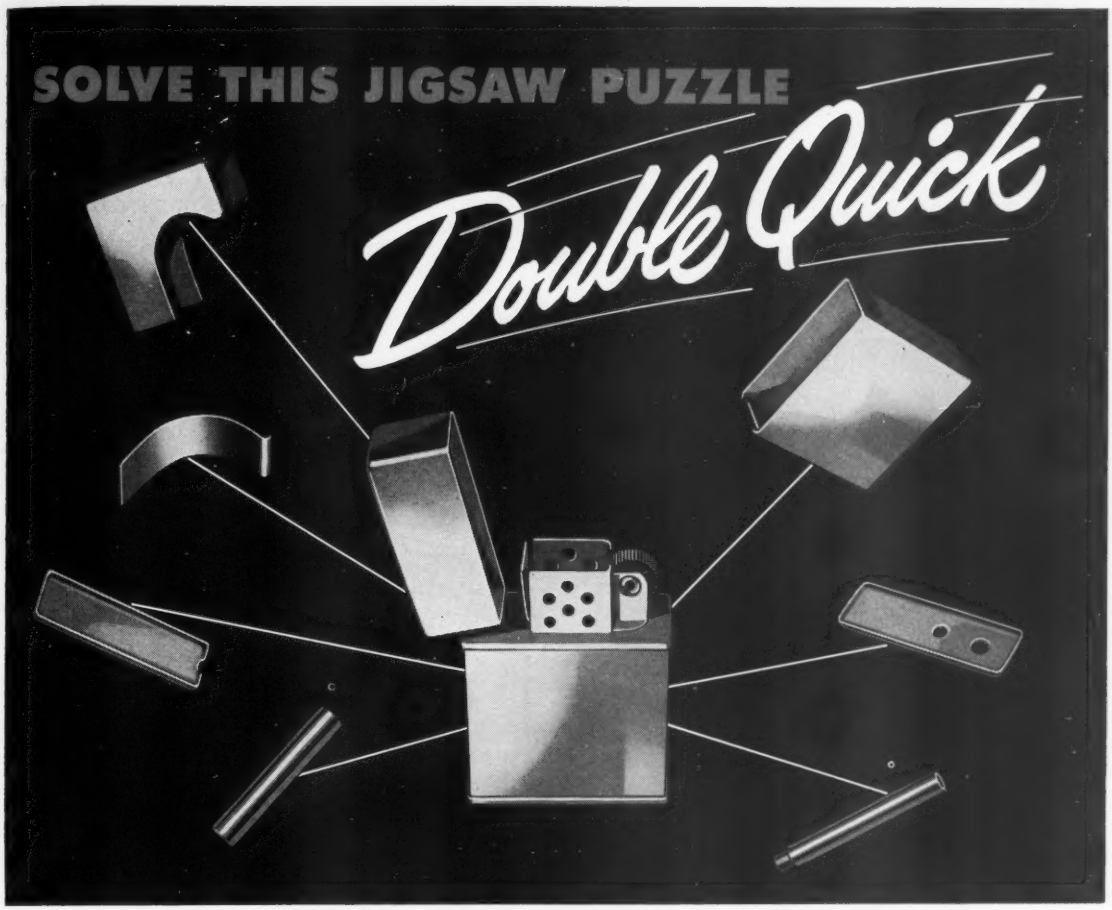
at sharp corners and obstructions. The front wheels turn as in a passenger car.

Turning radius is 8 feet. Truck has a 20-inch bed, is 4 feet wide and has a 5½-foot bed length. Drawbar capacity allows for a pull of 4000 to 6000 pounds. Top forward speed is 20 mph and a speed of 6.4 mph can be obtained in low or reverse.

**Check No. 14 on Reply Card for more Details**

## Power Feeder Added

A power feeder for the Floor-Veyor Jr. inclined power belt conveyor may be secured from the Rapids-Standard Co. Inc., Grand Rapids 2, Mich. The addition will transfer many types of packages from level to inclined conveyors, and vice versa. It adds to the conveyor's usefulness by handling very short or long articles that might not transfer smoothly from gravity feeders. Pitch of power feeder need




# with TOCCO* Induction Soldering

The American Emblem Co. wanted to speed production, cut costs and reduce rejects in the assembly of their "Ruliter" Cigarette Ignitors. Look what happened when they switched from hand soldering to automatic TOCCO soldering!

**COSTS DOWN**—Solder cost reduced 50%—repairs and rework due to misalignment of parts cut 98%.

**PRODUCTION UP**—A 7½kw 9600 cycle TOCCO unit with conveyor type fixture heats one assembly every 20 seconds—twice the former output.

**REJECTS ELIMINATED**—Formerly rejects due to leaking seams and uneven heating were frequent. TOCCO has eliminated these completely.

**TOCCO ENGINEERS**—are glad to survey your soldering, brazing, hardening or forging requirements to see where TOCCO can save you time and money, too.

**THE OHIO CRANKSHAFT COMPANY**

**TOCCO**

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*Mail Coupon Today*

NEW FREE BULLETIN

**THE OHIO CRANKSHAFT CO.**
**Dept. S-5, Cleveland 1, Ohio**

Please send copy of "Typical Results of TOCCO Induction Brazing and Soldering".

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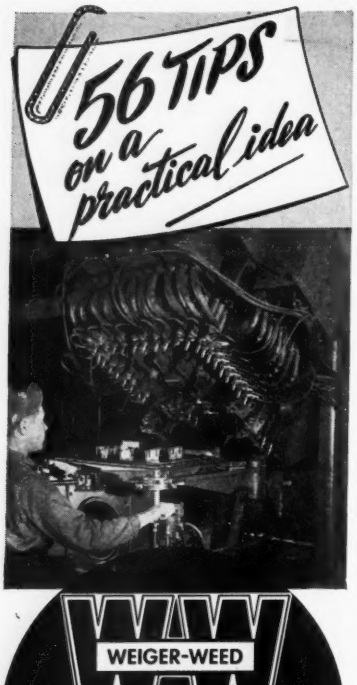



WEIGER-WEED

Spot Welding TIPS

In a single operation...with one flick of the wrist, 56 dependable WW Tips resistance-weld an automatic washing machine housing. In multiple welding operations like this, where every weld must be a good weld, the selection of the right spot welding tip becomes doubly important. For sound, clean welds—speedy welding—efficient cooling—long tip life—less down time—use WW Spot Welding Tips.

WW Tips are precision-machined of the correct alloys to provide the right physical and electrical properties. They are water-tight and electrically tight fitting. For the most dependable tips, both straight and offset—leak-proof holders—seam welding wheels—electrodes and dies—specify WW. They are available in numerous standard sizes from Weiger-Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Avenue, Detroit 4, Michigan.

*Send for WW Catalog "Standard Replaceable Welding Tips — Standard Water-Cooled Holders"*

WEIGER-WEED 12803-A

Resistance Welding ELECTRODES DIES • TIPS • WHEELS • HOLDERS

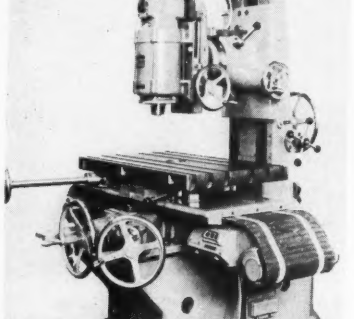

not be adjusted when direction of flow is reversed.

Manufactured in two widths to fit 10 on 16-inch belt width units, it may be attached to models already in use. Standard overall length of the feeder is 30 inches with longer models available to fit special handling problems. Power feeder is chain-driven from the take-up pulley in the main conveyor frame and the entire drive assembly is enclosed for safety.

**Check No. 15 on Reply Card for more Details**

## Vertical Milling Machine

Universal, high-speed vertical milling machines, made by Bohner & Koehle in the U. S. zone in Germany, are being offered in the U. S. by Kurt Orban Co. Inc., 21 West St., New York 6, N. Y. Two models are available for pattern making and metalworking in general. Model SF1 has



manual control for work table movement and adjustment of the power bracket, while model B3 SF1 is equipped with infinitely variable automatic feed.

Rotary work table for circular milling is provided. A special reversible motor serves as milling head and provides three speeds.

**Check No. 16 on Reply Card for more Details**

## Shiftless Bandsawing

Announcement of three new 15-inch bandsaw models which incorporate several design advancements is made by Tyler Mfg. Co. Inc., 1005 W. Arbor Vitae, Inglewood, Calif. Units provide speed ranges from 80 to 5000 fpm by a turn of a handcrank. There are no belts to change or gears to shift. A speed indicator located at eye level permits accurate adjustment.

A blade tracking arrangement utilizing a large yoke which places a pivot point at the crown of the upper band wheel holding the crown in perfect alignment with the bottom wheel at all times is incorporated in the unit. There is also a vernier-like control for top wheel adjustment to hairline accuracy. Flat blade guides

of hard cast bronze provide rigid alignment of the blade. They are adjustable fore and aft as well as sideways. The 16½ x 17-inch table is of precision ground cast iron box construction and tilts 45 degrees right and 5 degrees left.

**Check No. 17 on Reply Card for more Details**

## Central Motor Control

Multitrol control centers designed for accommodating any control system up to 600 volts, using components not larger than NEMA size 5 are made by Ward Leonard Electric Co., 115 MacQuesten Pkwy. S., Mt. Vernon, N. Y. Primary applications are for refrigeration and air conditioning systems, industrial plant machinery, generating plant auxiliaries and similar installations where a group of motors can be independently or interdependently controlled from a central location.

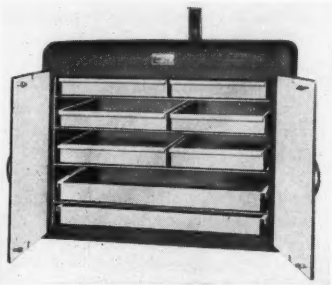
Prefabricated units containing control for a single motor are assembled and wired into a free standing steel enclosure section. Any number of sections may then be bolted and bussed together to form a control center. Units are available with magnetic full voltage starters, reversing or nonreversing; multispeed starters; primary or secondary resistance starters and autotransformer starters. Standard starters are equipped with

externally operated circuit breakers, thermal overload protection and low voltage protection.

**Check No. 18 on Reply Card for more Details**

## Small Portable Oven

Easy movement and operation from any 110 v outlet are features of the PL-1 portable electric oven made by Grieve-Hendry Co. Inc., 1101 N. Paulina St., Chicago 22, Ill. Unit has four shelves that have room for eight 2-inch deep by 12-inch wide by 23-inch long drying pans. Products or



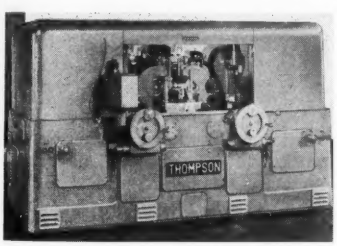
materials can be placed directly on the shelves if desired.

Construction is all steel, with air-cell asbestos insulation. A motor driver fan avoids stratification and makes the oven practical for any dehydration or baking process. It is capable of heating to 225° F in less than 15 minutes.

**Check No. 19 on Reply Card for more Details**

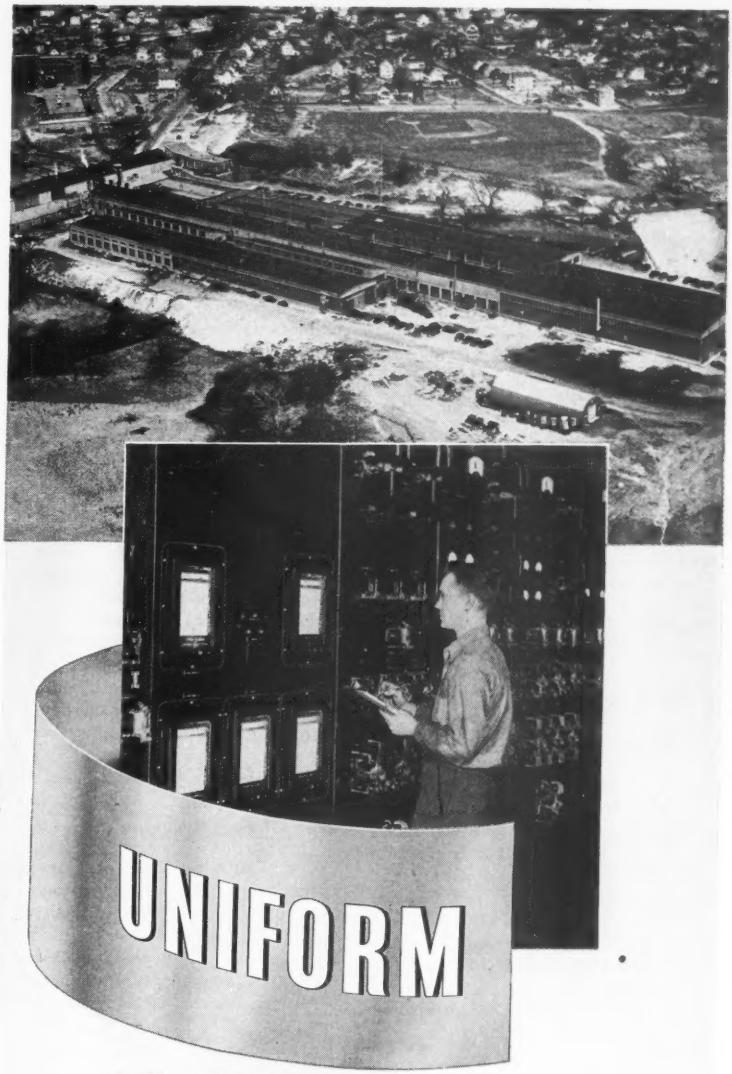
## Jet Bucket Grinder

Automatic contour grinding with two wheels simultaneously and dressing from a single crusher roll assures perfect symmetry in machining turbine buckets. This development by the Thompson Grinder Co., Springfield, O., is incorporated in its au-




tomatic double wheel Truforming machine. Hood doors of the machine, work clamps, coolant flow and grinding cycle are actuated in automatic sequence from the centralized control panel at the right.

Standard capacity machine permits the grinding of 3-inch length of surface and 1 inch width. Maximum




In this modern plant skilled craftsmen, modern equipment and scientific controls all combine forces to produce strip steel of consistently uniform quality. Wallingford uniformity means that gage, temper and surface are in all ways and at all times the same. Edges are always smooth and straight, surfaces uniformly clean and flat, widths consistently exact. This uniform quality means savings in preparation time and smoother, faster operation to cut down machine stoppages and minimize rejects.

THE WALLINGFORD STEEL CO.

SINCE 1922

WALLINGFORD, CONNECTICUT, U.S.A.

LOW CARBON • HIGH CARBON

ALLOY • STAINLESS • STRIP and TUBING

stock removal per wheel with automatic cycle is 0.150-inch. Spindle speed is 1800 rpm and vertical work speed is 3 to 84 inches per minute. Net weight of the machine including six electric motors is 22,000 pounds.

**Check No. 20 on Reply Card for more Details**

## High Hoist Efficiency

An electric chain hoist, the Rocket 51, is announced by David Round & Son, Cleveland 5, O. It features a V-belt driven cam actuated mechanism with a 10½ to 1 ratio that develops a hoisting efficiency of 95.6 per cent. This drive transmits power to the load wheel with less friction loss than in a gear assembly and at a saving in cost.

Weight of the hoist is 79 pounds and its headroom is 14 inches. Current models are built in 500 and 1000 pound capacities and powered by high-torque, 220/440 v, 3 phase, 60 cycle motors. Lifting speeds available are 17, 21, 24 and 34 feet per minute.

**Check No. 21 on Reply Card for more Details**

## Hand Pumps

Hand pumps in five series of 7, 10, 14 and 28 gallons per minute capacity, each in several models are introduced by Blackmer Pump Co., Grand Rapids, Mich. The new line is available in models as pump only; with suction and delivery pipes from drums and skid tanks; with return drip-pan for barrel mounting; with refueling hose and nozzle; with floor stand for underground tanks; with brackets for wall or foot mounting; with locking device; with changes of accessories for most combinations of above models.

**Check No. 22 on Reply Card for more Details**

## Controls Timed Operations

Designed for accurate control of a wide variety of timed operations, General Control Co., Boston 34, Mass., introduces a synchronous motor timer. Known as type SY Promatic timer, it can be used for all time periods between ½-second and 24 hours. It automatically resets for each new cycle. Unit is available for either 115 or 230 v, ac.

**Check No. 23 on Reply Card for more Details**

## Worm, Gear Operated Valves

Worm and gear operated valves are added to line of Homestead-Reiser lubrication plug valves, made by Homestead Valve Mfg. Co., Coraopolis, Pa. Known as Figure 502 GW, they have patented Self-Seald construction characteristic of the line, port area equivalent to 100 per cent of the area of standard pipe. Cast in semisteel, they are made in 8, 10 and 12-inch sizes.

**Check No. 24 on Reply Card for more Details**

## Rest for Large Work

For mounting extra large work in the lathe, South Bend Lathe Works, South Bend 22, Ind., announces a steady rest available for their 16-inch and 16-24-inch lathes. Rest takes work between 4¾ and 10¾ inches in diameter. It incorporates the improved compound thread jaw actuating mechanism. Top of the rest is hinged for easy mounting and removing of the work.

**Check No. 25 on Reply Card for more Details**

## One-Piece Sealing Ring

A one-piece sealing ring on which the sealing member is located on the inner side of the ring, is announced by Double Seal Ring Co., Ft. Worth, Tex. Designated as Inseal, its inner sealing member extends the full width of the ring, it has no top or bottom, and seals fully from both sides and cannot be installed upside down. It is available in sizes ranging from diameters of 4 to 96 inches.

**Check No. 26 on Reply Card for more Details**

## Redesigned Pressure Cells

Four SR-4 pressure cells in capacities up to 100 psi have been redesigned to make them insensitive to linear acceleration and position, according to Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. Capacities of these type E cells are 10, 20, 50 and 100 psi.

**Check No. 27 on Reply Card for more Details**

## Hydraulic Cylinders

Keeper ring design is used to permit rotation of covers of the new hydraulic cylinder made by Rivett Lathe & Grinder Inc., Boston, Mass. Covers may be rotated for any pipe connection and installation made in a minimum of space. External O rings are used as static seals to provide leakproof operation.

**Check No. 28 on Reply Card for more Details**

## Inside Micrometers

Two new inside micrometers are available from L. S. Starrett Co., Athol, Mass. No. 124 micrometers feature interchangeable solid rods and are made in four different models. No. 823 is made in two ranges, 1½ to 8 inches and 1½ to 12 inches. A feature is the ⅜-inch diameter tubular rod made of steel tubing, centerless ground, light in weight, extremely rigid. Rods may be attached to either or both ends of micrometer head.

**Check No. 29 on Reply Card for more Details**

## Red Lead Shop Coat

John W. Masury & Son Inc., Baltimore 30, Md., offers a red lead shop coat that has the general appearance of red lead. Designated as Masury Primer, it contains one and a half pounds red lead to the gallon. The vehicle is alkyd resin. It is said to give good protection without a finish coat for a year or more.

**Check No. 30 on Reply Card for more Details**

## Joints Resist Jaw Spread

Gray & Prior Machine Co., Hartford, Conn., announce ¾-inch and 4 3/16-inch size joints. They feature short, stubby jaws and large, equal size bearings which give joints maximum resistance to jaw spread. Sizes over 1½ inches are equipped with large grease reservoirs.

**Check No. 31 on Reply Card for more Details**

## Tool Sharpening Attachment

To provide faster and greater precision sharpening of end mills, countersinkers, spot facers, reamers and similar tools, Treyco Products, Buffalo 23, N. Y., has developed a new tool sharpening attachment for use with their sharpening fixture. Included with each attachment are ¼, ¼, ⅜ to ½-inch sleeves or adapters for interchanging various diameter tool shanks.

**Check No. 32 on Reply Card for more Details**

## Addresses, Marks Labels

Model K Tag-O-Graph, made by Weber Addressing Machine Co., Mt. Prospect, Ill., reproduces from a stencil which can be typewritten or hand written or hand lettered with a stylus. Special processed ink insures waterproof and fadeproof permanent impressions. Tags or labels are fed through the machine automatically at a speed of 150 per minute and an automatic counting device tabulates the exact number required.

**Check No. 33 on Reply Card for more Details**

**FOR MORE INFORMATION**

on the new products and equipment in this section, fill in a card. It will receive prompt attention.

# Helpful Literature

### 73. Sawing Lubricant

Macco Products Co.—4-page illustrated brochure, data sheets and illustrated folder present information on Macco 472 heavy-duty water soluble cutting lubricant for use in conjunction with tapping, milling, drilling, forming, sawing, turning, broaching and cutting-off operations.

### 74. Industrial Hardware

Thomas Laughlin Co.—44-page illustrated catalog No. 150 presents engineering information on line of wire rope and chain fittings. Detailed working characteristics are included, along with tables and charts which aid in selection.

### 75. General Purpose Pumps

Food Machinery Corp., Peerless Pump Div.—24-page illustrated catalog covers horizontal end-suction centrifugal type Fluidyne pumps. They can be driven by ¼ to 150-hp electric motors in capacities from 10 to 5500 gpm. Close-coupled electric motor driven type, bracket mounted type for flexible coupling, V-belt or flat-belt pulley are covered.

### 76. Spotwelder

Unitek Corp. — 4-page illustrated folder describes Unimatic industrial spotwelder for joining light gage metals and wire on production basis. Six-inch throat machine has one simple heat control knob which selects entire heat range. Welding pressure is adjustable. Unit is enclosed in 4½ x 8 x 11-in. case.

### 77. Loading Resistors

General Electric Co.—8-page illustrated bulletin GEA-5515 outlines advantages of loading resistors, their uses, ratings and dimensions as applied in testing diesel-electric locomotive power plants.

### 78. Plant Location

Public Service Electric & Gas Co.—20-page illustrated booklet "The Crossroads of the East" presents the case for moving industrial plants to sites in New Jersey. How its location, facilities, population, tax structure and utilities make such a move advantageous is related. Assistance in finding location of factory is available.

### 79. Force Indicator

Hunter Spring Co.—4-page illustrated bulletin presents engineering specifications on 12 models of Force Indicator for precision measurement of forces involved in design, research, production, inspection and maintenance. Capacities of these instruments range from 5 grams to 20 lb.

### 80. Heat Treating Furnaces

Surface Combustion Corp.—4-page illustrated bulletin SC-151 "Standard Rated Furnaces for Every Tool Room Heat Treatment" outlines features of atmosphere furnaces for clean hardening and annealing, direct-fired furnaces for hardening and annealing, convection furnaces for tempering and drawing and pot furnaces for drawing and nitriding. Atmosphere generators are also covered.

### 81. Tractor-Shovel

Frank G. Hough Co.—Illustrated catalog "Model HA Payloader" describes improved 12 cu ft Payloader tractor-shovel and shows applications of fast, compact bulk material handling unit.

### 82. Casting Resin

Ciba Co.—12-page illustrated booklet "Casting Resin B" deals with properties and instructions for use of Araldite ethoxyline resin. It it used in filling and embedding electrical apparatus, in joining metal supports to porcelain insulators and in joining certain plastics. When used with hardener 901, it sets under application of heat without need of pressure.

### 83. Plastic Coatings

Casey & Case Coating Co.—12-page bulletin "Corrosion Control Coatings" shows typical applications and outlines advantages obtainable with vinyl base plastic coatings for exteriors and tank linings. Chemical resistance of these inert coatings is listed.

### 84. Tumbler-Mixer

Rampe Mfg. Co.—2-page illustrated catalog sheet depicts and describes universal portable tumbler-mixer that tilts through 90 degrees and which will accommodate various types of containers to suit specific jobs. Adjustable turntable clamps permit standard and odd-shaped containers to be used, such as 5-gal pails, wooden boxes, cans, stone jars and laboratory beakers.

### 85. Lift Truck Accessories

Towmotor Corp.—4-page illustrated folder "Towmotor Special Engineering" explains purpose of special devices designed to grip, clamp, grab or support almost any type of load, and lift, transport, unload, deposit, dump, upend or revolve it. None are standard items, but are engineered for specialized handling problems.

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## HELPFUL LITERATURE

### 86. Accumulators
Greer Hydraulics, Inc.—Illustrated and revised bulletin No. 301 describes construction and operation of hydropneumatic Accumulators and shows circuits demonstrating how they are used as auxiliary source of power, in closed systems for holding work, as volume compensators and for operating secondary circuits.

### 87. Gas Appliances
Johnson Gas Appliance Co.—24-page illustrated catalog No. 51 depicts and describes burners; furnaces for hardening, tempering and annealing; valves; torches; mixers; and blowers.

### 88. Gear-Hobbing Machine
Carl Hirschmann Co.—6-page illustrated folder tells how type 75 semi-automatic gear-hobbing machine developed by S. Lambert helps achieve time savings exceeding 50 per cent by utilizing automatic radial and longitudinal feed in gear hobbing.

### 89. Cutting Tools
Severance Tool Industries, Inc.—12-page illustrated catalog "Severance All Stars" lists mills, cutters, countersinks, reamers and other tools made by company. Sizes, prices and regrinding information is presented.

### 90. Industrial Floor Absorbent
Speedi-Dri Corp.—6-page illustrated bulletin FB-10 outlines eight steps to aid in proper use of Speedi-Dri and Sol-Speedi-Dri industrial absorbents on floors with mineral oil accumulations and soluble oils, acids, syrups and resins, respectively. Products are intended to reduce hazards due to slipping as well as to protect against incipient fires.

### 91. Air Cooler
Comfort Products Corp.—6-page illustrated folder explains what Spray-Wheel air washers will do, how they do a better job and why they are economical to install and operate. Foot-thick water wall washes air after which it progresses through two filters to blower and then into ducting. Capacities range from 3500 to 20,000 cfm.

### 92. DC Power Supply
Industrial Electronics, Inc.—2-page illustrated data sheet details specifications and operation of Uni-Bridge model 128 universal direct current power supply and bridge control unit designed for use with transducers employing resistance elements. Instrument requires 25-w, 115 v, 50-60 cps power and is externally regulated.

### 93. Pulleys
Pyott Foundry & Machine Co.—4-page illustrated catalog No. 60 presents general information, specifications and other data on machine molded and cast iron pulleys of various types.

### 94. Smoke Alarm & Recorder
General Power Plant Corp.—Illustrated data sheet describes model A indicating and recording smoke alarm which makes continuous record of density of smoke present in breeching for any period of time. Record is made on 12-inch circular chart.

### 95. Milling Machine
Gubelin International Corp.—4-page illustrated bulletin describes Swiss milling machine suitable for manufacture of dies, tools, special screws and intricate parts. Machine is built by leading Swiss plant with long experience on precision mechanisms.

### 96. Thermo-Regulators
H-B Instrument Co.—12-page catalog No. 18 makes use of photographs and cut-away drawings to cover line of mercury-actuated thermo-regulators and thermostats. Quick-Set, Roll-Top and Multi-Contact thermo-regulators with three to 14 operating contacts are included.

### 97. Pattern-Draw Machines
SPO Inc.—4-page illustrated bulletin No. 500 is descriptive of six models of Series 500 jolt rock-over pattern draw machines. These machines have capacities ranging from 200 to 1500 lb, table sizes from 12 x 16 to 32 x 40 in. and pattern draw from 6½ to 20 in.

### 98. Cutting Tool Holder
Ready Tool Co.—8-page illustrated booklet covers spring tool holders of all types and sizes, including threading, forming and cutting. Also listed are lathe tool holders, shaper and planer tools, boring bar and internal threading tool holders, tool bits, blades, RED-E Tap-A-Hammer and ball chains.

### 99. Coil Cradles
Rowe Machinery & Mfg. Co.—4-page illustrated catalog 2151 lists line of "Easy Load" motor driven automatic coil cradles in capacities from 200 lb x 6 in. wide to 4000 lb x 40 in. wide. These machines facilitate production operations which utilize coiled stock.

### 100. Flexible Couplings
Lovejoy Flexible Coupling Co.—8-page illustrated catalog lists and describes L-R flexible couplings, Lovejoy-Ideal variable speed transmissions and Lovejoy-Dix universal joints. Design, construction, ratings, dimensions and typical applications are given.

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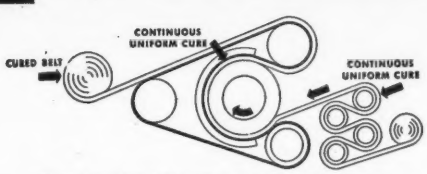
## ROTOCURE eliminates this common cause of Failure




SKETCH OF EXCLUSIVE ROTOCURE PROCESS

Although they often can't be detected with the naked eye, overcured segments or "Achilles' Heels" are present every 30 to 40 feet in belts cured by the flat press method. They occur because the vulcanization is *not* continuous due to overlapping. These press overlaps of 2" to 4" across the entire width of the belt get a double dose of curing. These segments make for costly operational weaknesses on the job and may result in early and complete failure of the belt.

* "Overcured Sections"—present every 30' to 40' in all belts made by the flat press method. *Only* Rotocuring eliminates this basic cause of belt failure.

**BWH ROTOCURED** belts are made differently — the *only* belts constructed by a continuous, endless curing process. Because press overlapping can't happen, overcuring is eliminated and flex life is improved by as much as 40%. Rotocure also eliminates mechanical distortion at the press ends . . . provides constant, uniform stretch . . . assures uniform abrasion resistant covers because one vulcanization and *only one* takes place. The end result is a better belt the first day you put it on . . . a more trouble-free belt day after day — a belt with MORE working days built into it! Ask your BWH distributor or write us direct.

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# The Market Outlook

TRANSITION to the Controlled Materials Plan in the distribution of steel, copper and aluminum, will be longer drawn out than many metalworking executives anticipated. Formal inauguration of the plan is set for July 1, but it looks as though it will be September, possibly October, before the new method of distribution can be made fully operative. Actually, third quarter promises to be little more than a warm-up period for CMP. It will be a period in which industry can become fully acquainted with rules and regulations, and in which administrative details and kinks, including the processing of voluminous paper work, can be smoothed out.

**PRODUCTION**— Steel mills are maintaining operations at record-breaking levels. How long this fast production pace can be maintained in the face of the severe beating production facilities have taken over the past year is a question. Certainly, the steelmakers are showing more concern and with the vacation season approaching they are giving thought to utilizing the idle time for mill repairs. Ingot operations in April averaged 103 per cent of capacity, with weekly output calculated at 2,059,000 net tons. Last week the national ingot rate held steady at 104 per cent.

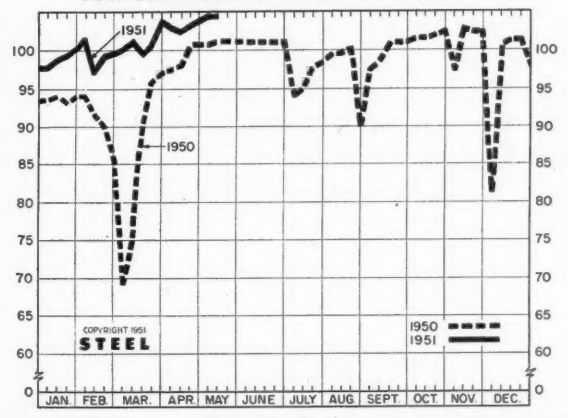
**CONTROLS**— Further cutbacks in civilian consumption of steel products are being put into effect. Automotive use of steel in June will be cut 5 percentage points to 75 per cent of the industry's consumption in the first half of 1950, and will drop another 5 points to 70 per cent beginning third quarter. Building steel use will be cut back further through latest regulations which necessitate government approval of all projects involving more than 25 tons of steel. Additional controls on civilian consumption are expected as time passes, possibly through restrictions on unit production.

**SUPPLY**— Rated tonnage on mill order books now extends months into the future and the volume is growing steadily. How much steel will be left over for unrated account after CMP requirements are satisfied, as yet, is unknown, and won't be known until government contractors' reports on needs are reported back to the control authorities. Some estimates of steel requirements that will come directly under CMP run far beyond 50 per cent of total production. In any event, a hectic scramble is certain among nonrated consumers for the tonnage left over after defense and essential civilian requirements are satisfied. That some cutbacks in directive programs may be necessary to ease the civilian steel scarcity is a possibility now being advanced in some quarters. Currently, unconfirmed reports are circulating to the effect a cut in steel supply for the freight car program is under consideration for July.

**SCHEDULING**— Pending word from Washington as to the extent of tonnages required for directive programs, the steel producers are being forced to set back their deadlines on carbon steel for the scheduling of July work. This deadline was scheduled originally for May 15. Expectations now are July rolling schedules eventually will be set up along much the same lines as heretofore, although overall requirements for defense and defense-support programs undoubtedly will be larger than in June. The mills also anticipate much the same scheduling pattern for August in view of the fact the Controlled Materials Plan is not likely to be ready for full application before September, if then.

**PRICES**— Except for the establishment of ceiling prices on ferrotungsten and other tungsten products, steel and related prices are unchanged. The ceilings on tungsten items reflect recent advances in costs. STEEL's finished steel weighted index holds at 171.92 as does the arithmetical composite at $106.32. No. 2 foundry pig iron is $52.54, basic, $52.16, and malleable, $53.27. The steelmaking scrap composite is steady at $44. Last year at this time scrap price averaged $31.67.

## NATIONAL STEELWORKS OPERATIONS




## DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

| | Week Ended May 12 | Change | Same Week 1950 | Same Week 1949 |
|---|---|---|---|---|
| Pittsburgh | 102 | + 1* | 100.5 | 95 |
| Chicago | 108 | — 1.5* | 104 | 99.5 |
| Mid-Atlantic | 101 | 0 | 97 | 92.5 |
| Youngstown | 106 | + 2 | 107 | 105 |
| Wheeling | 98.5 | + 1 | 104 | 90 |
| Cleveland | 101.5 | + 2* | 95.5 | 100.5 |
| Buffalo | 104 | 0 | 104 | 97.5 |
| Birmingham | 100 | 0 | 100 | 100 |
| New England | 98 | 0 | 87 | 66 |
| Cincinnati | 105 | + 3 | 106 | 101 |
| St. Louis | 86.5 | — 6 | 80 | 75.5 |
| Detroit | 106 | + 1* | 102 | 69 |
| Western | 104 | 0 | 95.5 | 93 |
| Estimated national rate | 104 | 0 | 100.5 | 95.5 |

Based on weekly steelmaking capacity of 1,999,034 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.
*Change from revised rate for preceding week.

# Composite Market Averages

| | May 10 1951 | Week Ago | Month Ago | Year Ago | 5 Yrs. Ago |
|---|---|---|---|---|---|
| **FINISHED STEEL INDEX, Weighted:** | | | | | |
| Index (1935-39 av.=100).. | 171.92 | 171.92 | 171.92 | 156.13 | 111.62 |
| Index in cents per lb. .... | 4.657 | 4.657 | 4.657 | 4.230 | 3.024 |
| **ARITHMETICAL PRICE COMPOSITES:** | | | | | |
| Finished Steel, NT ..... | $106.32 | $106.32 | $106.32 | $93.23 | 63.54 |
| No. 2 Fdry, Pig Iron, GT.. | 52.54 | 52.54 | 52.54 | 46.47 | 26.17 |
| Basic Pig Iron, GT ..... | 52.16 | 52.16 | 52.16 | 45.97 | 25.50 |
| Malleable Pig Iron, GT ... | 53.27 | 53.27 | 53.27 | 47.27 | 26.79 |
| Steelmaking Scrap, GT ... | 44.00 | 44.00 | 44.00 | 31.67 | 19.17 |

**Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 6-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.**

**Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.**

**Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.**

**Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.**

# Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

## FINISHED MATERIALS

| | May 10 1951 | Week Ago | Month Ago | Year Ago | 5 Yrs. Ago |
|---|---|---|---|---|---|
| Bars, H.R., Pittsburgh.... | 3.70 | 3.70 | 3.70 | 3.45 | 2.50 |
| Bars, H.R., Chicago ..... | 3.70 | 3.70 | 3.70 | 3.45 | 2.50 |
| Bars, H.R., del. Philadelphia | 4.20 | 4.20 | 4.20 | 3.93 | 2.82 |
| Bars, C.F., Pittsburgh .... | 4.55 | 4.55 | 4.55 | 4.10–15 | 3.10 |
| Shapes, Std., Pittsburgh .. | 3.65 | 3.65 | 3.65 | 3.40 | 2.35 |
| Shapes, Std., Chicago ..... | 3.65 | 3.65 | 3.65 | 3.40 | 2.35 |
| Shapes, del. Philadelphia .. | 3.91 | 3.91 | 3.91 | 3.46 | 2.465 |
| Plates, Pittsburgh ..... | 3.70 | 3.70 | 3.70 | 3.50 | 2.50 |
| Plates, Chicago ..... | 3.70 | 3.70 | 3.70 | 3.50 | 2.50 |
| Plates, Coatesville, Pa. ... | 4.15 | 4.15 | 4.15 | 3.60 | 2.50 |
| Plates, Sparrows Point, Md. | 3.70 | 3.70 | 3.70 | 3.50 | 2.50 |
| Plates, Claymont, Del. .... | 4.15 | 4.15 | 4.15 | 3.60 | 2.50 |
| Sheets, H.R., Pittsburgh... | 3.60–75 | 3.60–75 | 3.60–75 | 3.35 | 2.425 |
| Sheets, H.R., Chicago ..... | 3.60 | 3.60 | 3.60 | 3.35 | 2.425 |
| Sheets, C.R., Pittsburgh .. | 4.35 | 4.35 | 4.35 | 4.10 | 3.275 |
| Sheets, C.R., Chicago ..... | 4.35 | 4.35 | 4.35 | 4.10 | 3.275 |
| Sheets, C.R., Detroit ..... | 4.55 | 4.55 | 4.55 | 4.30 | 3.375 |
| Sheets, Galv., Pittsburgh.. | 4.80 | 4.80 | 4.80 | 4.40 | 4.05 |
| Strip, H.R., Pittsburgh.... | 3.75–4.00 | 3.75–4.00 | 3.75–4.00 | 3.25 | 2.35 |
| Strip, H.R., Chicago ..... | 3.50 | 3.50 | 3.50 | 3.25 | 2.35 |
| Strip, C.R., Pittsburgh ... | 4.65–5.35 | 4.65–5.35 | 4.65–5.35 | 4.15 | 3.05 |
| Strip, C.R., Chicago ..... | 4.90 | 4.90 | 4.90 | 4.30 | 3.15 |
| Strip, C.R., Detroit ..... | 4.35–5.60 | 4.35–5.60 | 4.35–5.60 | 4.35–40 | 3.15 |
| Wire, Basic, Pittsburgh.... | 4.85–5.10 | 4.85–5.10 | 4.85–5.10 | 4.50 | 3.05 |
| Nails, Wire, Pittsburgh ... | 5.90–6.20 | 5.90–6.20 | 5.90–6.20 | 5.30 | 3.25 |
| Tin plate, box, Pittsburgh. | $8.70 | $8.70 | $8.70 | $7.50 | $5.25 |

## SEMIFINISHED

| | | | | | |
|---|---|---|---|---|---|
| Billets, forging, Pitts.(NT) | $66.00 | $66.00 | $66.00 | $63.00 | $47.00 |
| Wire rods, ⅞-⅜", Pitts. .. | 4.10–30 | 4.10–30 | 4.10–30 | 3.85 | 2.30 |

## PIG IRON, Gross Ton

| | | | | | |
|---|---|---|---|---|---|
| Bessemer, Pitts. ..... | $53.00 | $53.00 | $53.00 | $47.00 | $27.00 |
| Basic Valley ..... | 52.00 | 52.00 | 52.00 | 46.00 | 26.00 |
| Basic, del. Phila. ..... | 56.49 | 56.49 | 56.49 | 49.44 | 27.84 |
| No. 2 Fdry, Pitts. ..... | 52.50 | 52.50 | 52.50 | 46.50 | 26.50 |
| No. 2 Fdry, Chicago ..... | 52.50 | 52.50 | 52.50 | 46.50 | 26.50 |
| No. 2 Fdry, Valley ..... | 52.50 | 52.50 | 52.50 | 46.50 | 26.50 |
| No. 2 Fdry, Del. Phila. ... | 56.99 | 56.99 | 56.99 | 49.94 | 28.34 |
| No. 2 Fdry, Birm. ..... | 48.88 | 48.88 | 48.88 | 42.38 | 22.88 |
| No. 2 Fdry (Birm.)del. Cin. | 55.33 | 55.33 | 55.33 | 49.08 | 26.94 |
| Malleable Valley ..... | 52.50 | 52.50 | 52.50 | 46.50 | 26.50 |
| Malleable, Chicago ..... | 52.50 | 52.50 | 52.50 | 46.50 | 26.50 |
| Charcoal, Lyles, Tenn. .... | 66.00 | 66.00 | 66.00 | 60.00 | 33.00 |
| Ferromanganese, Etna, Pa. | 188.00 | 188.00 | 188.00 | 175.00 | 140.00* |

* Delivered, Pittsburgh.

## SCRAP, Gross Ton (including broker's commission)

| | | | | | |
|---|---|---|---|---|---|
| No. 1 Heavy Melt. Pitts... | $45.00 | $45.00 | $45.00 | $36.00 | $20.00 |
| No. 1 Heavy Melt. E. Pa.. | 43.50 | 43.50 | 43.50 | 28.50 | 18.75 |
| No. 1 Heavy Melt. Chicago | 43.50 | 43.50 | 43.50 | 30.50 | 18.75 |
| No. 1 Heavy Melt. Valley.. | 45.00 | 45.00 | 45.00 | 35.25 | 20.00 |
| No. 1 Heavy Melt. Cleve.. | 44.00 | 44.00 | 44.00 | 31.75 | 19.50 |
| No. 1 Heavy Melt. Buffalo. | 44.00 | 44.00 | 44.00 | 29.75 | 19.25 |
| Rails, Rerolling, Chicago.. | 52.50 | 52.50 | 52.50 | 48.50 | 22.25 |
| No. 1 Cast, Chicago ..... | 49.00* | 49.00* | 49.00* | 42.50 | 20.00 |

* F.o.b. shipping point.

## COKE, Net Ton

| | | | | | |
|---|---|---|---|---|---|
| Beehive, Furn., Connisvl... | $14.75 | $14.75 | $14.75 | $14.25 | $7.50 |
| Beehive, Fdry., Connisvl.. | 17.50 | 17.50 | 17.50 | 16.00 | 8.25 |
| Oven Fdry., Chicago ..... | 21.00 | 21.00 | 21.00 | 21.00 | 13.00 |

## NONFERROUS METALS

| | | | | | |
|---|---|---|---|---|---|
| Copper, del. Conn. ..... | 24.50 | 24.50 | 24.50 | 19.50 | 12.00 |
| Zinc, E. St. Louis..... | 17.50 | 17.50 | 17.50 | 12.00 | 8.25 |
| Lead, St. Louis ..... | 16.80 | 16.80 | 16.80 | 11.80 | 6.35 |
| Tin, New York ..... | 139.00 | 142.00 | 147.00 | 77.75 | 52.00 |
| Aluminum, del. ..... | 19.00 | 19.00 | 19.00 | 17.00 | 15.00 |
| Antimony, Laredo, Tex. .. | 42.00 | 42.00 | 42.00 | 24.50 | 14.50 |
| Nickel, refinery, duty paid. | 50.50 | 50.50 | 50.50 | 40.00 | 35.00 |

# Pig Iron

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices do not include 3% federal tax. Key to producing companies published on second following page.

## PIG IRON, Gross Ton

| | Basic | No. 2 Foundry | Malleable | Bessemer |
|---|---|---|---|---|
| Bethlehem,Pa. B2 ..... | $54.00 | $54.50 | $55.00 | $55.50 |
| Brooklyn,N.Y.,del. ..... | .... | 58.69 | 59.46 | .... |
| Newark,del. ..... | 56.74 | 57.24 | 57.74 | 58.24 |
| Philadelphia,del. ..... | 56.49 | 56.99 | 57.49 | 57.99 |
| ***Birmingham District*** | | | | |
| AlabamaCity,Ala. R2 ..... | 48.38 | 48.88 | .... | .... |
| Birmingham R2 ..... | 48.38 | 48.88 | .... | .... |
| Birmingham S9 ..... | 48.38 | 48.88 | .... | .... |
| Woodward,Ala. W15 ..... | 48.38 | 48.88 | .... | .... |
| Cincinnati,del. ..... | .... | 55.33 | .... | .... |
| ***Buffalo District*** | | | | |
| Buffalo R2 ..... | 52.00 | 52.50 | 53.00 | .... |
| Buffalo H1 ..... | 52.00 | 52.50 | 53.00 | .... |
| Tonawanda,N.Y. W12 ..... | 52.00 | 52.50 | 53.00 | .... |
| No.Tonawanda,N.Y. T9 ..... | .... | 52.50 | 53.00 | .... |
| Boston,del. ..... | 61.63 | 62.13 | 62.63 | .... |
| Rochester,N.Y.,del. ..... | 54.74 | 55.24 | 55.74 | .... |
| Syracuse,N.Y.,del. ..... | 55.72 | 56.22 | 56.72 | .... |
| ***Chicago District*** | | | | |
| Chicago I-3 ..... | 52.00 | 52.50 | 52.50 | 53.00 |
| Gary,Ind. U5 ..... | 52.00 | .... | 52.50 | .... |
| IndianaHarbor,Ind. I-2 ..... | 52.00 | .... | 52.50 | .... |
| So.Chicago,Ill. W14 ..... | 52.00 | 52.50 | 52.50 | .... |
| So.Chicago,Ill. Y1 ..... | 52.00 | 52.50 | 52.50 | .... |
| So.Chicago,Ill. U5 ..... | 52.00 | .... | 52.50 | 53.00 |
| Milwaukee,del. ..... | 53.97 | 54.47 | 54.47 | 54.97 |
| Muskegon,Mich.,del. ..... | .... | 58.20 | 58.20 | .... |
| ***Cleveland District*** | | | | |
| Cleveland A7 ..... | 52.00 | 52.50 | 52.50 | 53.00 |
| Cleveland R2 ..... | 52.00 | 52.50 | 52.50 | .... |
| Akron, del. from Cleve. ..... | 54.49 | 54.99 | 54.99 | 55.49 |
| Lorain,O. N3 ..... | 52.00 | .... | .... | 53.00 |
| Duluth I-3 ..... | .... | .... | 52.50 | .... |
| Erie,Pa. I-3 ..... | 52.00 | 52.50 | 52.50 | 53.00 |
| Everett,Mass. E1 ..... | .... | 51.75 | 52.25 | .... |
| Fontana,Calif. K1 ..... | 58.00 | 58.50 | .... | .... |
| Geneva,Utah G1 ..... | 52.00 | 52.50 | .... | .... |
| Seattle, Tacoma,Wash.,del. ..... | .... | 60.35 | .... | .... |
| Portland,Oreg.,del. ..... | .... | 60.35 | .... | .... |
| LosAngeles,SanFrancisco,del. .... | 59.85 | 60.35 | .... | .... |
| GraniteCity,Ill. G4 ..... | 53.90 | 54.40 | 54.90 | .... |
| St.Louis,del. (inc. tax) ..... | 54.66 | 55.16 | 55.66 | .... |
| Ironton,Utah C11 ..... | 52.00 | 52.50 | .... | .... |
| LoneStar,Tex. L6 ..... | 48.00 | *48.50 | 48.50 | .... |
| Minnequa,Colo. C10 ..... | 54.00 | 55.00 | 55.00 | .... |
| ***Pittsburgh District*** | | | | |
| NevilleIsland,Pa. P6 ..... | .... | 52.50 | 52.50 | 53.00 |
| Pitts.,N.&S. sides, Ambridge, Aliquippa,del. ..... | .... | 53.74 | 53.74 | 54.24 |
| McKeesRocks,del. ..... | .... | 53.49 | 53.49 | 53.99 |
| Lawrenceville, Homestead, McKeesport,Monaca,del. ..... | .... | 54.00 | 54.00 | 54.50 |
| Verona,del. ..... | .... | 54.48 | 54.48 | 54.98 |
| Brackenridge,del. ..... | .... | 54.72 | 54.72 | 55.22 |
| Bessemer,Pa. U5 ..... | 52.00 | .... | 52.50 | 53.00 |
| Clairton,Rankin,So.Duquesne,Pa. U5 | 52.00 | .... | .... | .... |
| McKeesport,Pa. N3 ..... | 52.00 | .... | .... | 53.00 |
| Monessen,Pa. P7 ..... | 54.00 | .... | .... | .... |
| Sharpsville,Pa. S6 ..... | .... | .... | 52.50 | 53.00 |
| Steelton,Pa. B2 ..... | 54.00 | 54.50 | 55.00 | 55.50 |
| Swedeland,Pa. A3 ..... | 56.00 | 56.50 | 57.00 | 57.50 |
| Toledo,O. I-3 ..... | 52.00 | 52.50 | 52.50 | 53.00 |
| Cincinnati,del. ..... | 57.21 | 57.71 | .... | .... |
| Troy,N.Y. R2 ..... | 54.00 | 54.50 | 55.00 | 55.50 |
| ***Youngstown District*** | | | | |
| Hubbard,O. Y1 ..... | 52.00 | 52.50 | 52.50 | .... |
| Youngstown Y1 ..... | 52.00 | 52.50 | 52.50 | .... |
| Youngstown U5 ..... | 52.00 | .... | .... | 53.00 |
| Mansfield,O.,del. ..... | 56.43 | 56.93 | 56.93 | 57.43 |

* Low phos, southern grade.

## PIG IRON DIFFERENTIALS

*Silicon:* Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

*Phosphorus:* Deduct 38 cents per ton for P content of 0.70% and over.

*Manganese:* Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

*Nickel:* Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

## BLAST FURNACE SIVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

| | |
|---|---|
| Jackson,O. G2, J1 ..... | $62.50 |
| Buffalo H1 ..... | 63.75 |

## ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

| | |
|---|---|
| NiagaraFalls,N.Y. P15 ..... | $83.00 |
| Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2 ..... | 92.50 |
| Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2 | 95.50 |
| Wenatchee, Wash., O.H. & Fdry., frt. allowed K2..... | 92.50 |

## CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 x 6)

| | |
|---|---|
| Lyles,Tenn. T3 ..... | $66.00 |

## LOW PHOSPHOROUS PIG IRON, Gross Ton

| | |
|---|---|
| Cleveland, intermediate, A7 ..... | $57.00 |
| Steelton,Pa. B2 ..... | 60.00 |
| Philadelphia delivered ..... | 63.12 |
| Troy,N.Y. R2 ..... | 60.00 |

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# Semifinished and Finished Steel Products

Mill prices quoted under GCPR as reported to STEEL, May 10, 1951; cents per pound except as otherwise noted. Changes shown in italics.
Code numbers following mill points indicat e producing company; key on next two pages.

**INGOTS, Carbon, Forging (NT)**
Fontana, Calif. K1 ...$79.00
Munhall,Pa. U5 .....52.00

**INGOTS, Alloy (NT)**
Detroit R7 .....$54.00
Fontana,Calif. K1 ....80.00
Houston,Tex. S5 ....62.00
Midland,Pa. C18 .....54.00
Munhall,Pa. U5 .....54.00

**BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)**
Bessemer,Pa. U5 ....$56.00
Clairton,Pa. U5 .....56.00
Ensley,Ala. T2 .....56.00
Fairfield,Ala. T2 .....56.00
Fontana,Calif. K1 ....75.00
Gary,Ind. U5 .....56.00
Johnstown,Pa. B2 .....56.00
Lackawanna,N.Y. B2 ...56.00
Munhall,Pa. U5 .....56.00
So.Chicago,Ill. U5 ....56.00
So. Duquesne,Pa. U5 ..56.00

**Carbon, Forging (NT)**
Bessemer,Pa. U5 ....$66.00
Buffalo R2 .....66.00
Canton,O. R2 .....66.00
Clairton,Pa. U5 .....66.00
Cleveland R2 .....66.00
Conshohocken,Pa. A3 ..73.00
Detroit R7 .....69.00
Ensley,Ala. T2 .....66.00
Fairfield,Ala. T2 .....66.00
Fontana,Calif. K1 ....85.00
Gary,Ind. U5 .....66.00
Geneva,Utah G1 .....66.00
Houston,Tex. S5 .....74.00
Johnstown,Pa. B2 .....66.00
Lackawanna,N.Y. B2..66.00
LosAngeles B3 .....85.00
Munhall,Pa. U5 .....66.00
Seattle B3 .....85.00
So.ChicagoR2,U5,W14 .66.00
So.Duquesne,Pa. U5 ...66.00
So.SanFrancisco B3 ...85.00

**Alloy, Forging (NT)**
Bethlehem,Pa. B2 ...$70.00
Buffalo R2 .....70.00
Canton,O. R2 .....70.00
Canton,O. (29) T7 ....66.00
Conshohocken,Pa. A3 ..77.00
Detroit R7 .....73.00
Fontana,Calif. K1 ....89.00
Gary,Ind. U5 .....70.00
Houston,Tex. S5 .....78.00
Ind.Harbor,Ind. Y1 ...70.00
Johnstown,Pa. B2 ....70.00
Lackawanna,N.Y. B2..70.00
Los Angeles B3 .....90.00
Massillon,O. R2 .....70.00
Midland,Pa. C18 .....70.00
Munhall,Pa. U5 .....70.00
So.Chicago R2,U5,W14.70.00
So.Duquesne,Pa. U5 ...70.00
Struthers,O. Y1 .....70.00
Warren,O. C17 .....70.00

**ROUNDS, SEAMLESS TUBE (NT)**
Canton,O. R2 .....$82.00
Cleveland R2 .....82.00
Fontana,Calif. K1 ...103.00
Gary,Ind. U5 .....82.00
Massillon,O. R2 .....82.00
So.Chicago,Ill. R2 ...82.00
So.Duquesne,Pa. U5 ..82.00

**SHEET BARS (NT)**
Fontana,Calif. K1 ...$89.00

**SKELP**
Aliquippa,Pa. J5 .....3.45
Munhall,Pa. U5 .....3.35
Warren,O. R2 .....3.35
Youngstown R2, U5 ...3.35

**WIRE RODS**
AlabamaCity,Ala. R2 ..4.10
Buffalo W12 .....4.10
Cleveland A7 .....4.10
Donora,Pa. A7 .....4.10
Fairfield,Ala. T2 .....4.10
Fontana,Calif. K1 ....4.90
Houston,Tex. S5 .....4.50
Johnstown,Pa. B2 .....4.10
Joliet,Ill. A7 .....4.10
Los Angeles B3 .....4.90
Minnequa,Colo. C10 ....4.35
Monessen,Pa. P7 .....4.30
No.Tonawanda,N.Y.B11 4.10
Pittsburg,Calif. C11 ....4.75
Portsmouth,O. P12 ....4.30
Roebling,N.J. R5 .....4.20
So.Chicago,Ill. R2 .....4.10
SparrowsPoint,Md. B2 ..4.20
Sterling,Ill(1) N15 ....4.10
Struthers,O. Y1 .....4.10
Torrance,Calif. C11 ....4.90
Worcester A7 .....4.40

**PLATES, Wrought Iron**
Economy,Pa. B14 .....8.60

**STRUCTURALS**
**Carbon Steel Stand. Shapes**
AlabamaCity,Ala. R2 ..3.60
Aliquippa,Pa. J5 .....3.65
Bessemer,Ala. T2 .....3.65
Bethlehem,Pa. B2 .....3.70
Clairton,Pa. U5 .....3.65
Fairfield,Ala. T2 .....3.65
Fontana,Calif. K1 ....4.25
Gary,Ind. U5 .....3.65
Geneva,Utah G1 .....3.65
Houston,Tex. S5 .....4.05
Ind.Harbor,Ind. I-2 ....3.65
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.25
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.25
Minnequa,Colo. C10 ....4.10
Munhall,Pa. U5 .....3.65
Niles,Calif.(22) P1 ....4.85
Phoenixville,Pa. P4 ....4.95
Portland,Oreg. O4 .....4.50
Seattle B3 .....4.30
So.Chicago,Ill. U5, W14..3.65
So.SanFrancisco B3 ....4.20
Torrance,Calif. C11 ....4.25
Weirton,W.Va. W6 ....3.90

**Alloy Stand. Shapes**
Clairton,Pa. U5 .....4.35
Fontana,Calif. K1 ....5.55
Munhall,Pa. U5 .....4.35
So.Chicago,Ill. U5 .....4.35

**H.S., L.A. Stand. Shapes**
Aliquippa,Pa. J5 .....5.50
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa.(14) B2 ..5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 ....6.10
Gary,Ind. U5 .....5.50
Geneva,Utah G1 .....5.50
Ind.Harbor,Ind. I-2 ....5.50
Ind.Harbor,Ind. Y1 ....6.00
Johnstown,Pa. B2 .....5.50
Lackawanna,N.Y.(14)B2 5.50
LosAngeles B3 .....6.05
Munhall,Pa. U5 .....5.50
Seattle B3 .....6.10
So.Chicago, Ill. U5 ....5.50
So.SanFrancisco B3 ....6.00
Struthers,O. Y1 .....6.00

**Wide Flange**
Bethlehem,Pa. B2 .....3.70
Clairton,Pa. U5 .....3.65
Fontana,Calif. K1 ....4.65
Lackawanna,N.Y. B2 ...3.70
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 ....3.65

**H.S., L.A. Wide Flange**
Bethlehem,Pa. B2 .....5.50
Lackawanna,N.Y. B2 ...5.50
Munhall,Pa. U5 .....5.45
So.Chicago,Ill. U5 .....5.45

**SHEET STEEL PILING**
Ind.Harbor,Ind. I-2 ....4.45
Lackawanna,N.Y. B2 ...4.45
Munhall,Pa. U5 .....4.45
So.Chicago,Ill. U5 .....4.45

**BEARING PILES**
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 .....3.65

**PLATES, High-Strength Low-Alloy**
Aliquippa,Pa. J5 .....5.65
Bessemer,Ala. T2 .....5.65
Clairton,Pa. U5 .....5.65
Cleveland J5, R2 .....5.65
Conshohocken,Pa. A3 ..5.90
Fairfield,Ala. T2 .....5.65
Fontana,Calif.(30) K1 ..6.25
Gary,Ind. U5 .....5.65
Geneva,Utah G1 .....5.65
Ind.Harbor,Ind. I-2 ....5.65
Ind.Harbor,Ind. Y1 ....6.15
Johnstown,Pa. B2 .....5.65
Munhall,Pa. U5 .....5.65
Pittsburgh J5 .....5.65
Seattle B3 .....6.55
Sharon,Pa. S3 .....5.70
So.Chicago,Ill. U5 .....5.65
SparrowsPoint,Md. B2 ..5.65
Warren.O. R2 .....5.65
Youngstown Y1 .....6.15

**PLATES, Open-Hearth Alloy**
Claymont,Del. C22 ....4.85
Coatesville,Pa. L7 .....5.25
Conshohocken,Pa. A3 ..5.05
Fontana,Calif. K1 ....5.70
Gary, Ind. U5 .....4.75
Johnstown,Pa. B2 .....4.75
Munhall,Pa. U5 .....4.75
Sharon,Pa. S3 .....5.20
So.Chicago,Ill. U5 ....4.75
SparrowsPoint,Md. B2 ..4.75

**FLOOR PLATES**
Cleveland J5 .....4.75
Conshonocken,Pa. A3 ..4.75
Harrisburg,Pa. C5 ....5.95
Ind.Harbor,Ind. I-2 ....4.75
Munhall,Pa. U5 .....4.75
So.Chicago,Ill. U5 ....4.75

**PLATES, Carbon Steel**
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Ashland,Ky(15) A10 ...3.70
Bessemer,Ala. T2 .....3.70
Clairton,Pa. U5 .....3.70
Claymont,Del. C22 .....4.15
Cleveland J5, R2 .....3.70
Coatesville,Pa. L7 ....4.15
Conshohocken,Pa. A3 ..4.15
Fairfield,Ala. T2 .....3.70
Fontana,Calif.(30) K1 ..4.30
Gary,Ind. U5 .....3.70
GraniteCity,Ill. G4 ....4.40
Geneva,Utah G1 .....3.70
Harrisburg,Pa. C5 ....4.95
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Minnequa,Colo. C10 ....4.50
Munhall,Pa. U5 .....3.70
Pittsburgh J5 .....3.70
Seattle B3 .....4.60
Sharon,Pa. S3 .....3.95
So.Chicago,Ill. U5, W14..3.70
SparrowsPoint,Md. B2..3.70
Steubenville,O. W10 ....3.70
Warren,O. R2 .....3.70
Weirton,W.Va. W6 ....4.00
Youngstown R2, U5, Y1.3.70

**PLATES, Carbon A. R.**
Fontana,Calif. K1 ....5.45
Geneva,Utah G1 .....4.85

**PLATES, Ingot Iron**
Ashland,c.l.(15) A10 ...3.95
Ashland,lcl(15) A10 ....4.45
Cleveland,c.l. R2 .....4.30
Warren,O. c.l. R2 .....4.30

**BARS, Hot-Rolled Carbon**
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Alton,Ill.(1) Ld .....3.95
Atlanta,Ga. A11 .....4.25
Bessemer,Ala. T2 .....3.70
Buffalo R2 .....3.70
Canton,O. R2 .....3.70
Clairton,Pa. U5 .....3.70
Cleveland R2 .....3.70
Detroit R7 .....3.85
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 ....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 .....5.05
N.Tonawanda,N.Y. B11.3.70
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 .....4.65
Seattle B3, N14 .....4.45
So.Chicago R2, U5, W14.3.70
So.Duquesne,Pa. U5 ...3.70
So.SanFran.,Cal. B3 ...4.45
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Weirton,W. Va. W6 ....3.85
Youngstown R2, U5 ...3.70

**BAR SIZE ANGLES; S. SHAPES**
Aliquippa,Pa. J5 .....3.70
Atlanta A11 .....4.25
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Niles,Calif. P1 .....5.05
Portland,Oreg. O4 .....4.65
SanFrancisco S7 .....4.85

**BAR SIZE ANGLES; H.R. CARBON**
Bethlehem,Pa. B2 .....3.90

**BARS, Hot-Rolled Alloy**
Bethlehem,Pa. B2 .....4.30
Buffalo R2 .....4.30
Canton,O. R2 .....4.30
Canton,O.(29) T7 .....3.95
Clairton,Pa. U5 .....4.30
Detroit R7 .....4.45
Ecorse,Mich. G5 .....4.65
Fontana,Calif. K1 ....5.35
Gary,Ind. U5 .....4.30
Houston,Tex. S5 .....4.70
Ind.Harbor,Ind. I-2, Y1.4.30
Johnstown,Pa. B2 .....4.30
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.30
LosAngeles B3 .....5.35
Massillon,O. R2 .....4.30
Midland,Pa. C18 .....4.30
So.Chicago R2, U5, W14.4.30
So.Duquesne,Pa. U5 ...4.30
Struthers,O. Y1 .....4.30
Warren,O. C17 .....4.30
Youngstown U5 .....4.30

**BAR SHAPES, Hot-Rolled Alloy**
Clairton,Pa. U5 .....4.55
Gary,Ind. U5 .....4.55
Youngstown U5 .....4.55

**BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy**
Aliquippa,Pa. J5 .....5.55
Bessemer,Ala. T2 .....5.55
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.55
Cleveland R2 .....5.55
Fairfield,Ala. T2 .....5.55
Fontana,Calif. K1 ....6.60
Gary,Ind. U5 .....5.55
Ind.Harbor,Ind. I-2 ....5.55
IndianaHarbor,Ind. Y1..6.05
Johnstown,Pa. B2 .....5.55
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.25
Pittsburgh J5 .....5.55
Seattle B3 .....6.30
So.Duquesne,Pa. U5 ...5.55
So.SanFrancisco B3 ...6.30
Struthers,O. Y1 .....6.05
Youngstown U5 .....5.55

**BARS, Cold-Finished Carbon**
Ambridge,Pa. W18 ....4.55
BeaverFalls,Pa.M12,R2 .4.55
Buffalo B5 .....4.60
Camden,N.J. P13 .....5.00
Carnegie,Pa. C12 .....4.55
Chicago W18 .....4.55
Cleveland A7, C20 ....4.55
Detroit P17 .....4.70
Donora,Pa. A7 .....4.55
Elyria,O. W8 .....4.55
FranklinPark,Ill. N5 ...4.55
Gary,Ind. R2 .....4.55
GreenBay,Wis. F7 .....4.55
Hammond,Ind. L2, M13.4.55
Hartford,Conn. R2 ....5.10
Harvey,Ill. B5 .....4.55
LosAngeles R2 .....6.00
Mansfield,Mass. B5 ....5.10
Massillon,O. R2, R8 ....4.55
Monaca,Pa. S17 .....4.55
Newark,N.J. W18 .....5.00
Plymouth,Mich. P5 ....4.80
Pittsburgh J5 .....4.55
Putnam,Conn. W18 ....5.10
Readville,Mass. C14 ....5.10
St.Louis,Mo. M5 .....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa.(5) K3 ...5.00
Struthers,O. Y1 .....4.55
Waukegan,Ill. A7 .....4.55
Youngstown F3, Y1 ....4.55

**BARS, Cold-Finished Alloy**
Ambridge,Pa. W18 ....5.40
BeaverFalls,Pa. M12 ...5.40
Bethlehem,Pa. B2 .....5.40
Buffalo B5 .....5.40
Camden,N.J. P13 .....5.80
Canton,O. R2 .....5.40
Canton,O.(29) T7 .....4.90
Carnegie,Pa. C12 .....5.40
Chicago W18 .....5.40
Cleveland A7 .....5.45
Cleveland C20 .....5.40
Detroit P17 .....5.55
Donora,Pa. A7 .....5.45
Elyria,O. W8 .....5.40
Gary,Ind. R2 .....5.40
Hammond,Ind. L2, M13..5.40
Hartford,Conn. R2 ....5.85
Harvey,Ill. B5 .....5.40
Lackawana,N.Y. B2 ....5.40
Mansfield,Mass. B5 ....5.85
Massillon,O. R2, R8 ....5.40
Midland,Pa. C18 .....5.40
Monaca,Pa. S17 .....5.40
Newark,N.J. W18 .....5.75
Plymouth,Mich. P5 ....5.60
So.Chicago,Ill. R2, W14.5.40
Struthers,O. Y1 .....5.40
Warren,O. C17 .....5.40
Waukegan,Ill. A7 .....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40

**RAIL STEEL BARS**
ChicagoHts.(3,4)I-2, C2.4.75
Franklin,Pa. (3, 4) F5..4.75
FortWorth,Tex.(26) T4..4.85
Huntngtn,W.Va.(3) W7 .5.50
Marion,O.(3) P11 .....4.75
Moline,Ill.(3) R2 .....3.80
Tonawanda (3,4) B12 ..4.75
Williamsport(3) S19 ....5.00
Williamsport(4) S19 ....5.10

**BARS, Wrought Iron**
Dover,N.J.(Staybolt)U1 15.00
Dover,(Eng.Bolt) U1 ...13.50
Dover(Wrgt.Iron) U1 ...12.25
Economy,Pa. (S.R.) B14..9.60
Economy,Pa. (D.R.)B14 11.90
Economy,(Staybolt)B14 12.20
McK.Rks.(Staybolt) L5..14.50
McK.Rks.(S.R.) L5 ...9.60
McK.Rks.(D.R.) L5 ...13.00

**BARS, Reinforcing (Fabricators)**
AlabamaCity,Ala. R2 ..3.70
Alton,Ill.(6) L1 .....3.70
Atlanta A11 .....4.25
Buffalo R2 .....3.70
Cleveland R2 .....3.70
Emeryville,Calif. J7 ...4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 ....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor, Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.25
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.50
Niles,Calif. P1 .....5.05
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....4.40
Portland,Oreg. O4 .....4.65
SandSprings,Okla. S5 ....4.60
Seattle B3, N14 .....4.45
So.Chicago,Ill. R2 .....3.70
So.Duquesne,Pa. U5 ...3.70
So.SanFrancisco B3 ....4.45
SparrowsPoint,Md. B2 ..3.70
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Youngstown R2, U5 ...3.70

**BARS, Reinforcing (Fabricated; to Consumers)**
Huntington,W.Va. W7 ..5.50
Johnstown, ¼-1" B2 ..4.75
LosAngeles B3 .....5.45
Marion,O. P11 .....5.00
Seattle B3, N14 .....5.55
So.SanFrancisco B3 ....5.45
SparrowsPt. ¼-1" B2..4.75
Williamsport,Pa. S19 ...5.10

**SHEETS, Hot-Rolled Steel (18 gage and heavier)**
AlabamaCity,Ala. R2 ..3.60
Ashland,Ky.(8) A10 ...3.60
Butler,Pa. A10 .....3.60
Cleveland J5, R2 .....3.60
Conshohocken,Pa. A3 ...4.00
Detroit M1 .....4.40
Ecorse,Mich.(8) G5 ....3.80
Fairfield,Ala. T2 .....3.60
Fontana,Calif. K1 ....4.55
Gary,Ind. U5 .....3.60
Geneva,Utah G1 .....3.70
GraniteCity,Ill. G4 ....4.30
Ind.Harbor,Ind. I-2,Y-1.3.60
Irvin,Pa. U5 .....3.60
Lackawanna,N.Y. B2 ...3.60
Munhall,Pa. U5 .....3.60
Niles,O. N12 .....5.25
Pittsburg,Calif. C11 ....4.30
Pittsburgh J5 .....3.60
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ....3.60
SparrowsPoint,Md. B2 ..3.60
Steubenville,O. W10 ....3.60
Torrance,Calif. C11 ....4.30
Warren,O. R2 .....3.60
Weirton,W.Va. W6 .....3.60
WestLeechburg,Pa. A4..3.75
Youngstown U5, Y1 ...3.60

**SHEETS, H.R., (19 gage)**
AlabamaCity,Ala. R2 ...4.75
Dover,O. R1 .....5.65
Ind.Harbor,Ind. I-2 ....5.40
Mansfield,O. E6 .....5.65
Niles,O. N12 .....5.75
Torrance,Calif. C12 ....5.40

**SHEETS, H.R. (14-ga., heavier) High-Strength Low-Alloy**
Cleveland J5, R2 .....5.40
Conshohocken,Pa. A3 ..5.65
Ecorse,Mich. G5 .....5.95
Fairfield,Ala. T2 .....5.40
Fontana,Calif. K1 ....6.35
Gary,Ind. U5 .....5.40
Ind.Harbor,Ind. I-2 ....5.40
IndianaHarbor,Ind. Y1..5.90
Irvin,Pa. U5 .....5.40
Lackawanna(35) B2 ....5.40
Pittsburgh J5 .....5.40
Sharon,Pa. S3 .....5.40
So.Chicago,Ill. U5 .....5.40
SparrowsPoint(36) B2 ..5.40
Warren,O. R2 .....5.40
Weirton,W.Va. W6 .....5.75
Youngstown U5 .....5.40
Youngstown Y1 .....5.90

**SHEETS, Cold-Rolled High-Strength Low-Alloy**
Cleveland J5, R2 .....6.55
Ecorse,Mich. G5 .....7.10
Fontana,Calif. K1 .....7.50
Gary,Ind. U5 .....6.55
IndianaHarbor,Ind. Y1 .7.05
IndianaHarbor,Ind. I-2, 6.55
Irvin,Pa. U5 .....6.55
Lackawanna(37) B2 ....6.55
Pittsburgh J5 .....6.55
SparrowsPoint(38) B2 ..6.55
Warren,O. R2 .....6.55
Weirton,W.Va. W6 .....6.90
Youngstown Y1 .....7.05

**SHEETS, Cold-Rolled Steel (Commercial Quality)**

| | |
|---|---|
| Butler,Pa. A10 | 4.35 |
| Cleveland J5, R2 | 4.35 |
| Ecorse,Mich. G5 | 4.55 |
| Fairfield,Ala. T2 | 4.35 |
| Follansbee,W.Va. F4 | 5.35 |
| Fontana, Calif. K1 | 5.30 |
| Gary,Ind. U5 | 4.35 |
| GraniteCity,Ill. G4 | 5.05 |
| Ind.Harbor,Ind. I-2, Y1 | 4.35 |
| Irvin,Pa. U5 | 4.35 |
| Lackawanna,N.Y. B2 | 4.35 |
| Middletown,O. A10 | 4.35 |
| Pittsburg,Calif. C11 | 5.30 |
| Pittsburgh J5 | 4.35 |
| SparrowsPoint,Md. B2 | 4.35 |
| Steubenville,O. W10 | 4.35 |
| Warren,O. R2 | 4.35 |
| Weirton,W.Va. W6 | 4.35 |
| Youngstown Y1 | 4.35 |

**SHEETS, Galv'd No. 10 Steel**

| | |
|---|---|
| AlabamaCity,Ala. R2 | 4.80 |
| Ashland,Ky.(8) A10 | 4.80 |
| Canton,O R2 | 4.80 |
| Dover,O. R1 | 5.50 |
| Fairfield,Ala. T2 | 4.80 |
| Gary,Ind. U5 | 4.80 |
| GraniteCity,Ill. G4 | 5.50 |
| Ind.Harbor,Ind. I-2 | 4.80 |
| Irvin,Pa. U5 | 4.80 |
| Kokomo,Ind.(13) C16 | 5.20 |
| MartinsFerry,O. W10 | 4.80 |
| Niles,O. N12 | 6.00 |
| Pittsburg,Calif. C11 | 5.55 |
| SparrowsPoint,Md. B2 | 4.80 |
| Steubenville,O. W10 | 4.80 |
| Torrance,Calif. C11 | 5.55 |
| Weirton,W.Va. W6 | 4.80 |

**SHEETS, Galvanized No. 10, High-Strength Low-Alloy**

| | |
|---|---|
| Irvin,Pa. U5 | 7.20 |
| SparrowsPoint(39) B2 | 6.75 |

**SHEETS, Galvannealed Steel**

| | |
|---|---|
| Canton,O. R2 | 5.35 |
| Irvin,Pa. U5 | 5.35 |
| Kokomo,Ind.(13) C16 | 5.75 |
| Niles,O. N12 | 6.55 |

**SHEETS, ZINCGRIP Steel No. 10**

| | |
|---|---|
| Butler,Pa. A10 | 5.05 |
| Middletown,O. A10 | 5.05 |

**SHEETS, Electro Galvanized**

| | |
|---|---|
| Cleveland R2 (28) | 5.65 |
| Niles,O. R2 (28) | 5.65 |
| Weirton,W.Va. W6 | 5.50 |

**SHEETS, Zinc Alloy**

| | |
|---|---|
| Ind.Harbor,Ind. I-2 | 5.70 |

**SHEETS, Drum Body**

| | |
|---|---|
| Pittsburg,Calif. C11 | 4.30 |
| Torrance,Calif. C11 | 4.30 |

**SHEETS, Well Casing**

| | |
|---|---|
| Fontana,Calif. K1 | 5.10 |
| Torrance,Calif. C11 | 5.10 |

**BLUED Stock, 29 Ga.**

| | |
|---|---|
| Yorkville,O. W10 | 6.80 |
| Follansbee,W.Va.(23) F4 | 6.85 |

**ROOFING SHORT TERNES (8 lb. coated)**

| | |
|---|---|
| Gary,Ind. U5 | 9.50 |

**MANUFACTURING TERNES (Special Coated)**

| | |
|---|---|
| Fairfield,Ala. T2 | 7.60 |
| Gary,Ind. U5 | 7.50 |
| Irvin,Pa. U5 | 7.50 |
| SparrowsPoint,Md. B2 | 7.60 |
| Yorkville,O. W10 | 7.50 |

**SHEETS, LT. Coated Ternes, 6 lb**

| | |
|---|---|
| Yorkville,O. W10 | 8.40 |

**SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)**

| | |
|---|---|
| Gary,Ind. U5 | 9.50 |
| Yorkville,O. W10 | 9.50 |

**SHEETS, Long Terne Steel (Commercial Quality)**

| | |
|---|---|
| BeechBottom,W.Va. W10 | 5.20 |
| Gary,Ind. U5 | 5.20 |
| Mansfield,O. E6 | 6.05 |
| Middletown,O. A10 | 5.20 |
| Niles,O. N12 | 6.00 |
| Weirton,W.Va. W6 | 5.20 |

**SHEETS, Long Terne, Ingot Iron**

| | |
|---|---|
| Middletown,O. A10 | 5.60 |

**SHEETS, Enameling Iron**

| | |
|---|---|
| Ashland,Ky.(8) A10 | 4.65 |
| Cleveland R2 | 4.65 |
| Gary,Ind. U5 | 4.65 |
| GraniteCity,Ill. G4 | 5.35 |
| Ind.Harbor,Ind. I-2 | 4.65 |
| Irvin,Pa. U5 | 4.65 |
| Middletown,O. A10 | 4.65 |
| Youngstown Y1 | 4.65 |

| SHEETS, Culvert No. 16 | Cu Alloy | Cu Fe |
|---|---|---|
| Ashland A10 | 5.60 | ... |
| Canton,O. R2 | 5.65 | 6.10 |
| Fairfield,Ala. T2 | 5.60 | 5.85 |
| Gary, U5 | 5.60 | 5.85 |
| IndianaHarbor I-2 | 5.60 | 5.85 |
| Irvin,Pa. U5 | 5.60 | 5.85 |
| Kokomo C16 | 6.25 | ... |
| MartinsFy,O. W10 | 5.60 | 5.85 |
| Pittsburg,Cal. C11 | 6.35 | ... |
| SparrowsPt, B2 | 5.60 | ... |
| Torrance,Cal. C11 | 6.35 | ... |

**SHEETS, Culvert, No. 16 Pure Iron**

| | |
|---|---|
| Ashland,Ky. A10 | 5.85 |
| Fairfield,Ala. T2 | 5.85 |

**SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier**

| | |
|---|---|
| Ashland(8) A10 | 3.85 |
| Cleveland R2 | 4.20 |
| Ind.Harbor,Ind. I-2 | 3.85 |
| Warren,O. R2 | 4.20 |

**SHEETS, Cold-Rolled Ingot Iron**

| | |
|---|---|
| Cleveland R2 | 4.95 |
| Middletown,O. A10 | 4.85 |
| Warren,O. R2 | 4.95 |

**SHEETS, Galvanized Ingot Iron No. 10 flat**

| | |
|---|---|
| Ashland,Ky.(8) A10 | 5.05 |
| Canton,O. R2 | 5.55 |

**SHEETS, ZINCGRIP Ingot Iron**

| | |
|---|---|
| Butler,Pa. A10 | 5.30 |
| Middletown,O. A10 | 5.30 |

**SHEETS, ALUMINIZED**

| | |
|---|---|
| Butler,Pa. A10 | 8.15 |

**TIN PLATE, American Coke (Base Box)**

| | 1.25 lb | 1.50 lb |
|---|---|---|
| Aliquippa J5 | $8.45 | $8.70 |
| Fairfield,Ala T2. | 8.55 | 8.80 |
| Gary U5 | 8.45 | 8.70 |
| Ind.Har. I-2, Y1. | 8.45 | 8.70 |
| Irvin,Pa. U5 | 8.45 | 8.70 |
| Pitts.,Cal. C11 | 9.20 | 9.45 |
| Sp.Pt.Md. B2 | 8.55 | 8.80 |
| Warren R2 | 8.45 | 8.70 |
| Weirton W6 | 8.45 | 8.70 |
| Yorkville,O. W10. | 8.45 | 8.70 |

**BLACK PLATE (Base Box)**

| | |
|---|---|
| Aliquippa J5 | 6.25 |
| Fairfield,Ala. T2 | 6.35 |
| Gary,Ind. U5 | 6.25 |
| GraniteCity,Ill. G4 | 6.45 |
| Ind.Harbor,Ind. I-2, Y1. | 6.25 |
| Irvin,Pa. U5 | 6.25 |
| Niles,O. R2 | 6.25 |
| Pittsburg,Calif. C11 | 7.00 |
| SparrowsPoint,Md. B2 | 6.35 |
| Warren,O. R2 | 6.25 |
| Weirton,W.Va. W6 | 6.25 |
| Yorkville, O. W10 | 6.25 |

**HOLLOWARE ENAMELING Black Plate (29 gage)**

| | |
|---|---|
| Follansbee,W.Va. F4 | 5.85 |
| Gary,Ind. U5 | 5.85 |
| GraniteCity,Ill. G4 | 6.05 |
| Ind.Harbor,Ind. Y1 | 5.30 |
| Irvin,Pa. U5 | 5.85 |
| Yorkville,O. W10 | 6.15 |

**STRIP, Hot-Rolled Alloy**

| | |
|---|---|
| Bridgprt,Conn.(10) S15 | 5.45 |
| Carnegie,Pa. S18 | 5.85 |
| Fontana,Calif. K1 | 6.70 |
| Gary,Ind. U5 | 5.50 |
| Houston,Tex. S5 | 5.90 |
| KansasCity,Mo. S5 | 6.10 |
| Midland,Pa. C18 | 5.85 |
| NewBritn,Conn.(10) S15 | 5.45 |
| Sharon,Pa. S8 | 5.85 |
| Youngstown U5 | 5.50 |

**STRIP, Hot-Rolled, High-Strength Low-Alloy**

| | |
|---|---|
| Bessemer,Ala. T2 | 5.30 |
| Conshohocken,Pa. A3 | 5.55 |
| Ecorse,Mich. G5 | 5.95 |
| Fairfield,Ala. T2 | 5.30 |
| Fontana,Calif. K1 | 6.20 |
| Gary,Ind. U5 | 5.30 |
| Ind.Harb.,Ind. I-2 | 5.30 |
| IndianaHarbor,Ind. Y1 | 5.80 |
| Lackawanna,N.Y. B2 | 4.95 |
| LosAngeles(25) B3 | 6.05 |
| Seattle B3 | 6.30 |
| Sharon,Pa. S3 | 5.40 |
| So.SanFrancisco(25) B3 | 6.05 |
| SparrowsPoint,Md. B2 | 4.95 |
| Warren,O. R2 | 5.30 |
| Weirton,W.Va. W6 | 5.75 |
| Youngstown Y1 | 5.80 |
| Youngstown U5 | 5.30 |

**STRIP, Cold-Rolled, High-Strength Low-Alloy**

| | |
|---|---|
| Cleveland J5 | 6.70 |
| Cleveland A7 | 6.55 |
| Dover,O. G6 | 7.30 |
| Fontana,Calif. K1 | 6.95 |
| Lackawanna,N.Y. B2 | 6.40 |
| Sharon,Pa. S3 | 6.55 |
| SparrowsPoint,Md. B2 | 6.40 |
| Warren,O. R2 | 6.55 |
| Weirton,W.Va. W6 | 7.20 |
| Youngstown Y1 | 7.05 |

**STRIP, Hot-Rolled Carbon**

| | |
|---|---|
| Ala.City,Ala.(27) R2 | 3.50 |
| Alton,Ill.(1) L1 | 3.75 |
| Ashland,Ky.(8) A10 | 3.50 |
| Atlanta A11 | 4.05 |
| Bessemer,Ala. T2 | 3.50 |
| Bridgeprt.Conn.(10) S15 | 4.00 |
| Buffalo(27) R2 | 3.50 |
| Butler,Pa. A10 | 3.50 |
| Carnegie,Pa. S18 | 4.00 |
| Conshohocken,Pa. A3 | 3.90 |
| Detroit M1 | 4.40 |
| Ecorse,Mich. G5 | 3.80 |
| Fairfield,Ala. T2 | 3.50 |
| Fontana,Calif. K1 | 4.75 |
| Gary,Ind. U5 | 3.50 |
| Houston,Tex. S5 | 4.90 |
| Ind.Harbor,Ind. I-2, Y1. | 3.50 |
| Johnstown,Pa.(25) B2 | 3.50 |
| KansasCity,Mo.(9) S5 | 4.10 |
| Lackawanna,N.Y.(32) B2 | 3.50 |
| LosAngeles B3 | 4.25 |
| Milton,Pa. B6 | 4.00 |
| Minnequa,Colo. C10 | 4.55 |
| NewBritain (10) S15 | 4.00 |
| NoTonawanda,N.Y. B11 | 3.50 |
| Pittsburg,Calif. C11 | 4.25 |
| Riverdale,Ill. A1 | 3.50 |
| SanFrancisco S7 | 4.85 |
| Seattle B3, N14 | 4.50 |
| Sharon,Pa. S3 | 4.00 |
| So.Chicago,Ill. W14 | 3.50 |
| So.SanFrancisco B3 | 4.25 |
| SparrowsPoint,Md. B2 | 3.50 |
| Torrance,Calif. C11 | 4.25 |
| Warren,O. R2 | 3.50 |
| Weirton,W.Va. W6 | 3.60 |
| WestLeechburg,Pa. A4 | 3.75 |
| Youngstown U5, Y1 | 3.50 |

**STRIP, Cold-Rolled Alloy Steel**

| | |
|---|---|
| Bridgeprt,Conn.(10) S15 | 10.75 |
| Carnegie,Pa. S18 | 10.60 |
| Cleveland A7 | 10.00 |
| Dover,O. G6 | 10.50 |
| Fontana,Calif. K1 | 11.65 |
| Harrison,N.J. C18 | 10.60 |
| Midland,Pa. C18 | 10.60 |
| NewBritn,Conn.(10) S15 | 10.75 |
| Pawtucket,R.I.(11) N8 | 10.75 |
| Pawtucket,R.I.(12) N8 | 11.05 |
| Sharon,Pa. S3 | 10.60 |
| Worcester,Mass. A7 | 10.30 |
| Youngstown C8 | 10.60 |

**STRIP, Cold-Rolled Carbon**

| | |
|---|---|
| Anderson,Ind.(40) G6 | 5.50 |
| Berea,O. C7 | 6.60 |
| Bridgprt,Conn.(10) | S15 5.35 |
| Butler,Pa. A10 | 4.65 |
| Cleveland A7, J5 | 4.65 |
| Dearborn,Mich. D3 | 5.60 |
| Detroit D2 | 5.60 |
| Detroit M1 | 5.45 |
| Dover,O.(40) G6 | 5.50 |
| Ecorse,Mich. G5 | 4.85 |
| Follansbee,W.Va. F4 | 5.35 |
| Fontana,Calif. K1 | 6.30 |
| FranklinPark,Ill.(40) T6 | 4.90 |
| Ind.Harbor,Ind. I-2 | 4.90 |
| Lackawanna,N.Y. B2 | 4.65 |
| LosAngeles C1 | 6.40 |
| Mattapan,Mass. T6 | 5.50 |
| Middletown,O. A10 | 4.65 |
| NewBritain(10) S15 | 5.35 |
| NewCastle,Pa. B4 | 5.35 |
| NewCastle(40) E5 | 5.25 |
| NewHaven,Conn. D2 | 5.85 |
| NewHaven,Conn. A7 | 5.15 |
| Pawtucket,R.I. R3 | 6.00 |
| Pawtucket,R.I.(21) N8 | 5.85 |
| Riverdale,Ill.(40) A1 | 4.90 |
| Rome,N.Y. R6 | 5.10 |
| Sharon,Pa. S3 | 5.35 |
| SparrowsPoint,Md. B2 | 4.65 |
| Trenton,N.J. R5 | 6.00 |
| Wallingford,Conn. W2 | 5.85 |
| Warren,O.(40) T5 | 5.25 |
| Warren,O. R2 | 4.65 |
| Weirton,W.Va. W6 | 4.65 |
| Youngstown C8 (40) | 5.25 |
| Youngstown Y1 | 4.65 |

**STRIP, Electro Galvanized**

| | |
|---|---|
| Dover,O. G6 | 5.50 |
| Warren,O. T5 | 5.25 |
| Weirton,W.Va. W6 | 4.65 |
| Youngstown C8 | 5.25 |

| STRIP, Cold-Finished, Spring Steel (Annealed) | 0.26-0.40C | 0.41-0.60C | 0.61-0.80C | 0.81-1.05C | 1.06-1.35C |
|---|---|---|---|---|---|
| Berea,O. C7 | ... | 6.80 | 7.40 | 9.35 | 11.65 |
| Bridgeport,Conn.(10) S15 | 5.35 | 6.80 | 7.40 | 9.35 | 11.65 |
| Bristol,Conn. W1 | ... | ... | 7.70 | 9.65 | .... |
| Carnegie,Pa. S18 | .... | 6.80 | 7.40 | 9.35 | 11.65 |
| Cleveland A7 | 4.65 | 6.45 | 7.40 | 9.35 | 11.65 |
| Dearborn,Mich. D3 | 5.60 | 7.05 | 7.65 | ... | .... |
| Detroit D2 | 5.60 | 6.65 | 7.25 | ... | .... |
| Dover,O. G6 | 5.50 | 6.80 | 7.40 | 9.35 | 11.65 |
| FranklinPark,Ill. T6 | 5.00 | 6.60 | 7.55 | 9.50 | 11.80 |
| Harrison,N.J. C18 | .... | ... | 7.70 | 9.65 | 11.95 |
| Mattapan,Mass. T6 | 5.50 | 6.75 | 7.70 | 9.65 | 11.95 |
| NewBritn.,Conn.(10) S15 | 5.35 | 6.80 | 7.40 | 9.35 | 11.65 |
| NewCastle,Pa. B4 | 5.35 | 6.80 | 7.40 | 9.35 | .... |
| NewCastle,Pa. E5 | 5.50 | 6.80 | 7.40 | 9.35 | 11.65 |
| NewHaven,Conn. D2 | 5.85 | 6.75 | 7.35 | ... | .... |
| NewYork W3 | ... | 7.10 | 7.70 | 9.65 | 11.95 |
| Pawtucket,R.I. N8: Cleve.-or-Pitts.Base | ... | 6.80 | 7.40 | 9.35 | 11.65 |
| Worcester,Base | 5.85 | 7.10 | 7.70 | 9.65 | 11.95 |
| Sharon,Pa. S3 | 5.35 | 6.80 | 7.40 | 9.35 | 11.65 |
| Trenton,N.J. R5 | .... | 7.10 | 7.70 | 9.65 | 11.95 |
| Wallingford,Conn. W2 | 5.85 | 6.75 | 7.35 | 9.30 | 11.60 |
| Weirton,W.Va. W6 | 5.35 | 6.80 | 7.40 | 9.35 | 11.65 |
| Worcester,Mass. A7 | 4.95 | 6.75 | 7.70 | 9.65 | 11.95 |
| Worcester,Mass. T6 | 5.50 | 6.75 | 7.70 | 9.65 | 11.95 |
| Youngstown C8 | ... | 6.80 | 7.40 | 9.35 | 11.65 |

**Spring Steel (Tempered)**

| | | | | | |
|---|---|---|---|---|---|
| Trenton,N.J. R5 | ... | ... | 10.30 | 12.50 | 15.35 |
| Harrison,N.J. C18 | .... | ... | 10.30 | 12.50 | 15.35 |
| NewYork, W3 | ... | ... | 10.30 | 12.50 | 15.35 |

| TIN PLATE, Electrolytic (Base Box) | 0.25 lb | 0.50 lb | 0.75 lb |
|---|---|---|---|
| Aliquippa,Pa. J5 | $7.15 | $7.40 | $7.80 |
| Fairfield,Ala. T2 | 7.25 | 7.50 | 7.90 |
| Gary,Ind. U5 | 7.15 | 7.40 | 7.80 |
| GraniteCity,Ill. G4 | 7.35 | 7.60 | 8.00 |
| Ind.Harbor,Ind. I-2, Y1 | 7.15 | 7.40 | 7.80 |
| Irvin,Pa. U5 | 7.15 | 7.40 | 7.80 |
| Niles,O. R2 | 7.15 | 7.40 | 7.80 |
| Pittsburg,Calif. C11 | 7.90 | 8.15 | 8.55 |
| SparrowsPoint,Md. B2 | 7.25 | 7.50 | 7.90 |
| Weirton,W.Va. W6 | 7.15 | 7.40 | 7.80 |
| Yorkville,O. W10 | 7.15 | 7.40 | 7.80 |

| SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower) | Field | Arma-ture | Elec-tric | Motor | Dyna-mo |
|---|---|---|---|---|---|
| BeechBottom W10 (cut lengths) | ... | ... | 7.25 | 8.50 | 9.30 |
| Brackenridge,Pa. A4 | ... | ... | 7.75 | 9.00 | 9.80 |
| GraniteCity,Ill.G4 (cut lengths) | ... | ... | 7.95 | 9.20 | ... |
| Ind.Harbor,Ind. I-2 | 6.95 | 7.25 | (34) | ... | ... |
| Mansfield,O. E6 (cut lengths). | 7.10 | 7.25 | 7.75 | 9.00 | 9.80 |
| Niles,O. N12 (cut lengths) | ... | 6.75 | 7.25 | ... | ... |
| Vandergrift,Pa. U5 | ... | 7.25 | 7.75 | 9.00 | 9.80 |
| Warren,O. R2 | 6.95 | 7.25 | 7.75 | 9.00 | 9.80 |
| Zanesville,O. A10 | ... | 7.25 | 7.75 | 9.00 | 9.80 |

| SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower) Transformer Grade | 72 | 65 | 58 | 52 |
|---|---|---|---|---|
| BeechBottom W10 (cut lengths) | 9.85 | 10.40 | 11.10 | 11.90 |
| Brackenridge,Pa. A4 | 10.35 | .... | .... | .... |
| Vandergrift,Pa. U5 | 10.35 | 10.90 | 11.60 | 12.40 |
| Warren,O. R2 | 10.35 | .... | .... | .... |
| Zanesville,O. A10 | 10.35 | 10.90 | 11.60 | 12.40 |

| H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.) | T-100 | T-90 | T-80 | T-73 |
|---|---|---|---|---|
| Butler,Pa. A10 (C.R.) | .... | .... | 14.75 | 15.25 |
| Vandergrift,Pa. U5 | 12.90 | 13.75 | 14.75 | 15.25 |

## Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

**STRIP, Hot-Rolled Ingot Iron**

| | |
|---|---|
| Ashland,Ky. (8) A10 | 3.75 |
| Warren,O. R2 | 4.10 |

**STRIP, Cold-Rolled Ingot Iron**

| | |
|---|---|
| Warren,O. R2 | 5.25 |

**TIGHT COOPERAGE HOOP**

| | |
|---|---|
| Atlanta A11 | 4.05 |
| Riverdale,Ill. A1 | 3.90 |
| Sharon,Pa. S3 | 4.15 |
| Youngstown U5 | 3.75 |

**WIRE, Merchant Quality**

| (6 to 8 gage) | An'ld | Galv. |
|---|---|---|
| AlabamaCity R2 | 5.70 | 5.95 |
| Aliquippa J5 | 5.70 | 6.15 |
| Atlanta A11 | 5.95 | 6.40 |
| Bartonville(19) K4 | 5.70 | 6.15 |
| Buffalo W12 | 4.85 | ... |
| Cleveland A7 | 5.70 | 6.15 |
| Crawfordsville M8 | 5.95 | 6.40 |
| Donora A7 | 5.70 | 6.15 |
| Duluth A7 | 5.70 | 6.15 |
| Fairfield T2 | 5.70 | 6.15 |
| Houston,Tex. S5 | 6.10 | 6.55 |
| Johnstown B2 | 5.70 | 6.15 |
| Joliet,Ill. A7 | 5.70 | 6.15 |
| KansasCy,Mo. S5 | 6.30 | 6.75 |
| Kokomo C16 | 5.80 | 6.05 |
| LosAngeles B3 | 6.65 | ... |
| Minnequa C10 | 5.95 | 6.45 |
| Monessen P7 | 5.95 | 6.40 |
| Palmer W12 | 5.15 | ... |
| Pitts.Calif. C11 | 6.65 | 6.80 |
| Prtsmth.(18)P12 | 6.10 | 6.60 |
| Rankin A7 | 5.70 | 6.15 |
| So.Chicago R2 | 5.70 | 5.95 |
| So.S.Fran. C10 | 6.65 | 7.10 |
| Sparrows Pt. B2 | 5.80 | 6.25 |
| Sterling,Ill.(1)N15 | 5.70 | 6.15 |
| Struthers,O. Y1 | 5.70 | 6.15 |
| Torrance,Cal. C11 | 6.65 | ... |
| Worcester A7 | 6.00 | 6.45 |

| WIRE, (16 gage) | An'ld Stone | Galv. Stone |
|---|---|---|
| Aliquippa J5 | 10.15 | 12.15 |
| Bartonville(1) K4 | 10.25 | 11.95 |
| Cleveland A7 | 10.25 | 12.15 |
| Crawfrdsvle M8 | 10.30 | 12.00 |
| Fostoria,O. S1 | 10.40 | 13.00 |
| Johnstown B2 | 10.25 | 12.15 |
| Kokomo C16 | 10.25 | 11.95 |
| Minnequa C10 | 10.40 | 12.40 |
| Palmer,Mass.W12 | 10.25 | 12.15 |
| Pitts.Cal. C11 | 10.60 | 12.50 |
| Prtsmth.(18) P12 | 10.55 | 12.30 |
| SparrowsPt. B2 | 10.35 | 12.25 |
| Waukegan A7 | 10.25 | 12.15 |

**ROPE WIRE**

| | (A) | (B) |
|---|---|---|
| Bartonville,Ill. K4 | 8.55 | 8.80 |
| Buffalo W12 | 8.55 | 8.80 |
| Cleveland A7 | 8.55 | 8.80 |
| Donora,Pa. A7 | 8.55 | 8.80 |
| Fostoria, O. S1 | 8.85 | 9.10 |
| Johnstown,Pa. B2 | 8.55 | 8.80 |
| Monessen,Pa. P16 | 8.55 | 8.80 |
| Monessen,Pa. P7 | 8.80 | 9.05 |
| NewHaven A7 | 8.85 | 9.10 |
| Palmer,Mass. W12 | 8.85 | 9.10 |
| Portsmouth,O. P12 | 8.55 | 8.80 |
| Roebling,N.J. R5 | 8.85 | 9.10 |
| SparrowsPt. B2 | 8.65 | 8.90 |
| Struthers, O. Y1 | 8.55 | 8.80 |
| Trenton,N.J. A7 | 8.85 | 9.10 |
| Waukegan,Ill. A7 | 8.55 | 8.80 |
| Worcester J4, T6 | 8.85 | 9.10 |

(A) Plow and Mild Plow.
(B) Improved Plow.

**WIRE, Manufacturers Bright, Low Carbon**

| | |
|---|---|
| AlabamaCity,Ala. R2 | 4.85 |
| Aliquippa,Pa. J5 | 4.85 |
| Atlanta A11 | 5.10 |
| Alton,Ill. (1) L1 | 4.85 |
| Bartonville,Ill. (1) K4 | 4.85 |
| Buffalo W12 | 4.85 |
| Chicago W13 | 5.10 |
| Cleveland A7, C20 | 4.85 |
| Crawfordsville,Ind. M8 | 5.10 |
| Donora,Pa. A7 | 4.85 |
| Duluth,Pa. A7 | 4.85 |
| Fairfield,Ala. T2 | 4.85 |
| Fostoria,O.(24) S1 | 5.35 |
| Houston S5 | 5.25 |
| Johnstown,Pa. B2 | 4.85 |
| Joliet, Ill. A7 | 4.85 |
| KansasCity,Mo. S5 | 5.45 |
| Kokomo,Ind, C16 | 4.95 |
| LosAngeles B3 | 5.80 |
| Minnequa,Colo. C10 | 5.10 |
| Monessen,Pa. P7 | 5.10 |
| Newark, 6-8ga. I-1 | 5.50 |
| No. Tonawanda B11 | 4.85 |
| Palmer,Mass. W12 | 5.15 |
| Pittsburg,Calif. C11 | 5.80 |
| Portsmouth,O. P12 | 5.25 |
| Rankin,Pa. A7 | 4.85 |
| So.Chicago,Ill. R2 | 4.85 |
| So.SanFrancisco C10 | 5.80 |
| SparrowsPoint,Md. B2 | 4.95 |
| Sterling,Ill. (1) N15 | 4.85 |
| Struthers,O. Y1 | 4.85 |
| Torrance,Calif. C11 | 5.80 |
| Waukegan,Ill. A7 | 4.85 |
| Worcester,Mass. A7, T6 | 5.15 |

**WIRE, Cold-Rolled Flat**

| | |
|---|---|
| Anderson,Ind. G6 | 6.20 |
| Buffalo W12 | 6.35 |
| Cleveland A7 | 5.85 |
| Crawfordsville,Ind. M8 | 6.20 |
| Detroit D2 | 6.20 |
| Dover,O. G6 | 6.20 |
| Fostoria,O. S1 | 6.00 |
| Kokomo,Ind. C16 | 5.70 |
| FranklinPark,Ill. T6 | 6.20 |
| Massillon,O. R8 | 5.85 |
| Monessen,Pa. P16 | 5.85 |
| Monessen,Pa. P7 | 6.10 |
| NewHaven,Conn. D2 | 6.50 |
| Pawtucket,R.I. (12) N8 | 6.85 |
| Trenton,N.J. R5 | 6.15 |
| Worcester A7 | 6.15 |
| Worcester T6 | 6.50 |
| Worcester W12 | 6.65 |

**WIRE, Fine & Weaving(8" Coils)**

| | |
|---|---|
| Bartonville,Ill.(1) K4 | 8.90 |
| Buffalo W12 | 8.90 |
| Chicago W13 | 8.90 |
| Cleveland A7 | 8.90 |
| Crawfordsville,Ind. M8 | 8.95 |
| Fostoria,O. S1 | 8.90 |
| Johnstown,Pa. B2 | 8.90 |
| Kokomo,Ind. C16 | 8.90 |
| Monessen,Pa. P16 | 8.90 |
| Palmer,Mass. W12 | 9.20 |
| Portsmouth,O. P12 | 8.90 |
| Roebling,N.J. R5 | 9.20 |
| Waukegan,Ill. A7 | 8.90 |
| Worcester,Mass. A7, T6 | 9.20 |

**WIRE, Galv'd ACSR For Cores**

| | |
|---|---|
| Bartonville,Ill. K4 | 8.50 |
| Monessen,Pa. P16 | 8.50 |
| Roebling,N.J. R5 | 8.80 |
| SparrowsPoint,Md. B2 | 8.60 |
| Johnstown,Pa. B2 | 8.50 |

**WIRE, Tire Bead**

| | |
|---|---|
| Bartonville,Ill.(1) K4 | 10.90 |
| Monessen,Pa. P16 | 11.40 |
| Roebling,N.J. R5 | 11.55 |

**WIRE, MB Spring, High Carbon**

| | |
|---|---|
| Aliquippa,Pa. J5 | 6.25 |
| Alton,Ill.(1) L1 | 6.25 |
| Bartonville,Ill.(1) K4 | 6.25 |
| Buffalo W12 | 6.25 |
| Cleveland A7 | 6.25 |
| Donora,Pa. A7 | 6.25 |
| Duluth A7 | 6.25 |
| Fostoria,O. S1 | 6.25 |
| Johnstown,Pa. B2 | 6.25 |
| LosAngeles B3 | 7.20 |
| Milbury,Mass.(12) N6 | 8.05 |
| Monessen,Pa. P7, P16 | 6.25 |
| Palmer,Mass. W12 | 6.55 |
| Pittsburg,Calif. C11 | 7.20 |
| Roebling,N.J. R5 | 6.55 |
| Portsmouth,O. P12 | 6.25 |
| So.Chicago,Ill. R2 | 6.25 |
| So.SanFrancisco C10 | 6.85 |
| SparrowsPoint,Md. B2 | 6.35 |
| Struthers,O. Y1 | 6.25 |
| Trenton,N.J. A7 | 6.55 |
| Waukegan,Ill. A7 | 6.25 |
| Worcester A7, T6, W12 | 6.55 |
| Worcester,Mass. J4 | 6.75 |

**WIRE, Upholstery Spring**

| | |
|---|---|
| Aliquippa,Pa. J5 | 5.90 |
| Alton,Ill.(1) L1 | 5.90 |
| Buffalo W12 | 5.90 |
| Cleveland A7 | 5.90 |
| Donora,Pa. A7 | 5.90 |
| Duluth A7 | 5.90 |
| Johnstown,Pa. B2 | 5.90 |
| LosAngeles B3 | 6.85 |
| Monessen,Pa. P7, P16 | 5.90 |
| NewHaven,Conn. A7 | 6.20 |
| Palmer,Mass. W12 | 6.20 |
| Pittsburg,Calif. C11 | 7.10 |
| Portsmouth,O. P12 | 5.90 |
| Roebling,N.J. R5 | 6.20 |
| So.Chicago,Ill. R2 | 5.90 |
| SparrowsPoint,Md. B2 | 6.00 |
| Torrance,Calif. C11 | 7.10 |
| Trenton,N.J. A7 | 6.20 |
| Waukegan,Ill. A7 | 5.90 |
| Worcester,Mass. A7 | 6.20 |

**WOVEN FENCE, 9-15½ Ga.**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 126 |
| Ala.City,Ala.,17-18ga.R2 | 213 |
| Aliquippa,Pa.9-14½ga.J5 | 130 |
| Atlanta A11 | 133 |
| Bartonville,Ill.(19) K4 | 130 |
| Crawfordsville,Ind. M8 | 132 |
| Donora,Pa. A7 | 130 |
| Duluth A7 | 130 |
| Fairfield,Ala. T2 | 130 |
| Houston,Tex. S5 | 138 |
| Johnstown,Pa. B2 | 130 |
| Johnstown,17ga.,6" B2 | 204 |
| Johnstown,17ga.,4" B2 | 207 |
| Joliet,Ill. A7 | 130 |
| KansasCity,Mo. S5 | 142 |
| Kokomo,Ind. C16 | 132 |
| Minnequa,Colo. C10 | 138 |
| Monessen,Pa. P7 | 135 |
| Pittsburg,Calif. C11 | 153 |
| Portsmouth,O.(18) P12 | 137 |
| Rankin,Pa. A7 | 130 |
| So. Chicago,Ill. R2 | 126 |
| Sterling,Ill.(1) N15 | 130 |

**FENCE POSTS**

| | Col. |
|---|---|
| ChicagoHts.,Ill. C2 | 140 |
| Duluth A7 | 125 |
| Franklin,Pa. F5 | 140 |
| Huntington,W.Va. W7 | 140 |
| Johnstown,Pa. B2 | 140 |
| Marion,O. P11 | 140 |
| Minnequa,Colo. C10 | 130 |
| Moline,Ill. R2 | 136 |
| So.Chicago R2 | 140 |
| Tonawanda B12 | 140 |
| Williamsport,Pa. S19 | 150 |

**WIRE, Barbed**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 136 |
| Aliquippa,Pa. J5 | 140 |
| Atlanta A11 | 143 |
| Bartonville,Ill.(19) K4 | 143 |
| Crawfordsville M8 | 145 |
| Donora,Pa. A7 | 140 |
| Duluth,Minn. A7 | 140 |
| Fairfield,Ala. T2 | 140 |
| Houston,Tex. S5 | 148 |
| Johnstown,Pa. B2 | 140 |
| Joliet,Ill. A7 | 140 |
| KansasCity,Mo. S5 | 152 |
| Kokomo,Ind. C16 | 142 |
| Minnequa,Colo. C10 | 146 |
| Monessen,Pa. P7 | 145 |
| Pittsburg,Calif. C11 | 160 |
| Portsmouth,O.(18) P12 | 147 |
| Rankin,Pa. A7 | 140 |
| So.Chicago,Ill. R2 | 136 |
| So.SanFran.,Calif. C10 | 160 |
| SparrowsPoint,Md. B2 | 142 |
| Sterling,Ill.(1) N15 | 140 |

**BALE TIES, Single Loop**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 123 |
| Atlanta A11 | 126 |
| Bartonville,Ill.(19) K4 | 123 |
| Crawfordsville M8 | 132 |
| Donora,Pa. A7 | 123 |
| Duluth A7 | 123 |
| Fairfield,Ala. T2 | 123 |
| Joliet,Ill. A7 | 123 |
| KansasCity,Mo. S5 | 135 |
| Kokomo,Ind. C16 | 125 |
| Minnequa,Colo. C10 | 128 |
| Pittsburgh,Calif. C11 | 147 |
| So.Chicago,Ill. R2 | 123 |
| So.SanFran.,Calif. C10 | 147 |
| SparrowsPoint,Md. B2 | 125 |
| Sterling,Ill.(1) N15 | 123 |

**NAILS & STAPLES, Non-Stock**

| | |
|---|---|
| AlabamaCity,Ala. R2 | 6.10 |
| Bartonville,Ill.(19) K4 | 5.95 |
| Crawfordsville,Ind. M8 | 6.30 |
| Donora,Pa. A7 | 5.95 |
| Duluth A7 | 5.95 |
| Johnstown,Pa. B2 | 5.95 |
| Joliet,Ill. A7 | 5.95 |
| Kokomo,Ind. C16 | 6.05 |
| Minnequa,Colo. C10 | 6.20 |
| Pittsburg,Calif. C11 | 6.90 |
| Portsmouth,O. P12 | 6.25 |
| Rankin,Pa. A7 | 5.95 |
| So.Chicago,Ill. R2 | 6.10 |
| SparrowsPoint,Md. B2 | 6.05 |
| Sterling,Ill.(1) N15 | 5.65 |
| Worcester,Mass. A7 | 6.25 |

**NAILS, Cut (100 lb keg) To dealers (33)**

| | |
|---|---|
| Conshohocken,Pa. A3 | $7.35 |
| Wheeling,W.Va. W10 | 7.15 |

**NAILS & STAPLES, Stock To dealers & mfrs. (7)**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 118 |
| Aliquippa,Pa.(13) J5 | 118 |
| Atlanta A11 | 121 |
| Bartonville,Ill.(19) K4 | 118 |
| Chicago,Ill. W13 | 118 |
| Cleveland A9 | 125 |
| Crawfordsville,Ind. M8 | 122 |
| Donora,Pa. A7 | 118 |
| Duluth A7 | 118 |
| Fairfield,Ala. T2 | 118 |
| Galveston,Tex. D7 | 126 |
| Houston,Tex. S5 | 126 |
| Johnstown,Pa. B2 | 118 |
| Joliet,Ill. A7 | 118 |
| KansasCity,Mo. S5 | 130 |
| Kokomo,Ind. C16 | 120 |
| Minnequa,Colo. C10 | 123 |
| Monessen,Pa. P7 | 124 |
| Pittsburg,Calif. C11 | 137 |
| Portsmouth,O. P12 | 124 |
| Rankin,Pa. A7 | 118 |
| So.Chicago,Ill. R2 | 118 |
| SparrowsPoint,Md. B2 | 120 |
| Sterling,Ill.(1) N15 | 118 |
| Torrance,Calif. C11 | 138 |
| Worcester,Mass. A7 | 124 |

**STANDARD TRACK SPIKES**

| | |
|---|---|
| Ind.Harbor,Ind. I-2, Y1 | 6.15 |
| KansasCity,Mo. S5 | 6.40 |
| Lebanon,Pa. B2 | 6.15 |
| Minnequa,Colo. C10 | 6.15 |
| Pittsburgh J5 | 6.15 |
| Seattle B3 | 6.65 |
| So.Chicago,Ill. R2 | 6.15 |
| Struthers,O. Y1 | 6.15 |
| Youngstown R2 | 6.15 |

**TRACK BOLTS (20) Treated**

| | |
|---|---|
| KansasCity,Mo. S5 | 9.85 |
| Lebanon,Pa.(32) B2 | 9.85 |
| Minnequa,Colo. C10 | 9.85 |
| Pittsburgh O3, P14 | 9.85 |
| Seattle B3 | 10.10 |

**TIE PLATES**

| | |
|---|---|
| Fairfield,Ala. T2 | 4.50 |
| Gary,Ind. U5 | 4.50 |
| Ind.Harbor,Ind. I-2 | 4.50 |
| Lackawanna,N.Y. B2 | 4.50 |
| Minnequa,Colo. C10 | 4.50 |
| Pittsburg,Calif. C11 | 4.65 |
| Seattle B3 | 4.65 |
| Steelton,Pa. B2 | 4.50 |
| Torrance,Calif. C11 | 4.65 |

**JOINT BARS**

| | |
|---|---|
| Bessemer,Pa. U5 | 4.70 |
| Fairfield,Ala. T2 | 4.70 |
| Ind.Harbor,Ind. I-2 | 4.70 |
| Joliet,Ill. U5 | 4.70 |
| Lackawanna,N.Y. B2 | 4.70 |
| Minnequa,Colo. C10 | 4.70 |
| Steelton,Pa. B2 | 4.70 |

**AXLES**

| | |
|---|---|
| Ind.Harbor,Ind. S18 | 5.60 |
| Johnstown,Pa. B2 | 5.60 |

| RAILS | Std. No. 1 | Std. No. 2 | Std. All No. 2 | TeeRails 60 lb Under |
|---|---|---|---|---|
| Bessemer,Pa. U5 | 3.60 | 3.50 | 3.55 | 4.00 |
| Ensley,Ala. T2 | 3.60 | 3.50 | ... | 4.00 |
| Fairfield,Ala. T2 | ... | ... | ... | 4.00 |
| Gary,Ind. U5 | 3.60 | 3.50 | 3.55 | ... |
| Huntington,W.Va. W7 | ... | ... | ... | 5.00 |
| Ind.Harbor,Ind. I-2 | 3.60 | 3.50 | 3.55 | ... |
| Johnstown,Pa. B2 | ... | ... | ...(16) | 4.00 |
| Lackawanna B2 | 3.60 | 3.50 | ... | 4.00 |
| Minnequa,Colo. C10 | 3.60 | 3.50 | ... | 4.50 |
| Steelton,Pa. B2 | 3.60 | 3.50 | ... | ... |
| Williamsport,Pa. S19 | ... | ... | ... | 4.75 |

## Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb,Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sioss-Sheffield, S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

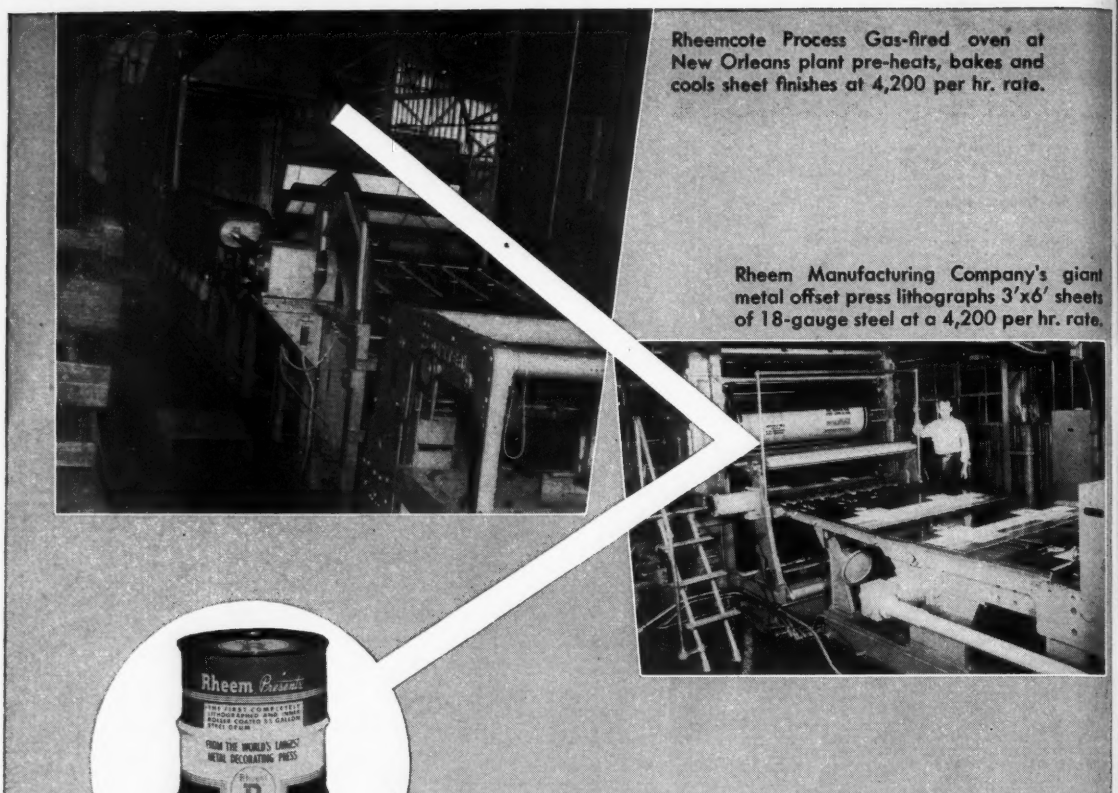
Y1 Youngstown Sheet & Tube

## TOOL STEEL

| Grade | Cents per lb | Grade | Cents per lb |
|---|---|---|---|
| Reg. Carbon | 23.00 | 13.5W,4Cr,3V | 140.00 |
| Extra Carbon | 27.00 | 18W,4Cr,2V,9Co | 217.50 |
| Spec. Carbon | 32.50 | 19W,4Cr,2V,7Co | 217.50 |
| Oil Hardening | 35.00 | 18.25W,4.25Cr,1V,4.75Co | 185.50 |
| Cr Hot Wrk | 35.00 | 20.25W,4.25Cr,1.6V,12.25Co | 323.00 |
| Hi-Carbon-Cr | 63.50 | 1.5W,4Cr,1V,8.5Mo | 78.50 |
| 18W,4Cr,1V | 123.50 | 6.4W,4.5Cr,1.9V,5Mo | 87.00 |
| 18W,4Cr,2V | 138.00 | 6W,4Cr,3V,6Mo | 109.50 |

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2, V3.

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ⅛" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga. 36" wide.
(24) Deduct 0.20c,finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, mill lengths, to fabricators; to consumers, 5.60c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared, add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter: 60" & narrower.
(38) 14 gage & lighter: 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.


Rheemcote Process Gas-fired oven at New Orleans plant pre-heats, bakes and cools sheet finishes at 4,200 per hr. rate.
Rheem Manufacturing Company's giant metal offset press lithographs 3′x6′ sheets of 18-gauge steel at a 4,200 per hr. rate.
Rheem Presents
FROM THE WORLD'S LARGEST METAL DECORATING PRESS
color lithography on metal
depends on GAS for processing
at Rheem Manufacturing Company

Rheem Manufacturing Company's engineers worked with engineers of Wagner Litho Machinery Division to develop the GAS oven and related equipment necessary to lithograph and fabricate 55-gallon steel drums.

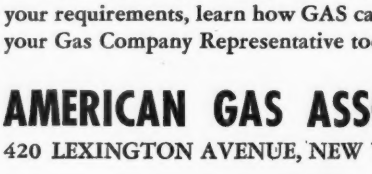
18-gauge steel sheets, 3′x6′ are fed into the giant offset press at a maximum speed of 4,200 per hr. After printing and coating, the sheets travel through a Gas-fired 210′ oven to be dried:

Pre-heat zone: 200°-275° F. for 6 min.
Baking zone: 175°-450° F. for 15 min.
Controlled cooling zone for 7 min.

After lithographing one side and lining the other, sheets are fabricated into steel drums. This Rheemcote Process permits users to identify their products in drums with familiar, colorful trade-marks. Liquid and solid materials and chemicals are shipped all over the world in these Brand-name drums.

The Rheemcote Process is an example of how GAS can be used to meet specialized problems in a production line. Gas is the ideal fuel to use, because Gas temperatures are readily controlled automatically, because Gas is clean, efficient, and economical. Whatever your requirements, learn how GAS can serve you. Call your Gas Company Representative today for the facts.

**AMERICAN GAS ASSOCIATION**
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.



## STANDARD PIPE, T. & C.

| BUTTWELD Size Inches | List Per Ft | Pounds Per Ft | Carload Discounts from List, % —Black— A | B | C | —Galvanized— D | E | F |
|---|---|---|---|---|---|---|---|---|
| ⅛ | 5.5c | 0.24 | 34.0 | 32.0 | 29.0 | 1.5 | +0.5 | +3.5 |
| ¼ | 6.0 | 0.42 | 28.5 | 26.5 | 23.5 | +1.0 | +3.0 | +6.0 |
| ⅜ | 6.9 | 0.57 | 23.5 | 21.5 | 18.5 | +7.0 | +9.0 | +12.0 |
| ½ | 8.5 | 0.85 | 36.0 | 34.0 | 35.0 | 14.0 | 12.0 | 13.0 |
| ¾ | 11.5 | 1.13 | 39.0 | 37.0 | 38.0 | 18.0 | 16.0 | 17.0 |
| 1 | 17.0 | 1.68 | 41.5 | 39.5 | 40.5 | 21.5 | 19.5 | 20.5 |
| 1¼ | 23.0 | 2.28 | 42.0 | 44.0 | 41.0 | 22.0 | 24.0 | 21.0 |
| 1½ | 27.5 | 2.78 | 42.5 | 41.5 | 41.5 | 23.0 | 21.5 | 22.0 |
| 2 | 37 | 3.68 | 43.0 | 41.0 | 42.0 | 23.5 | 21.5 | 22.5 |
| 2½ | 58.5 | 5.82 | 43.5 | 41.5 | 42.5 | 24.0 | 22.0 | 23.0 |
| 3 | 76.5 | 7.62 | 43.5 | 41.5 | 42.5 | 24.0 | 22.0 | 23.0 |

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ⅛", 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ¼" and ⅜". Following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36¼% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11½ points lower on ⅛" and larger continuous weld and 24% on 3½" and 4".

Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Gary base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ⅛", plus 2½% on ¼", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅛", 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ⅛" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

| SEAMLESS AND ELECTRIC WELD Size Inches | List Per Ft | Pounds Per Ft | Carload Discounts from List, % Seamless Black A | Galv. B | Elec. Weld Black C | Galv. D |
|---|---|---|---|---|---|---|
| 2 | 37.0c | 3.68 | 29.5 | 9.5 | 29.5 | 9.5 |
| 2½ | 58.5 | 5.82 | 32.5 | 12.5 | 32.5 | 12.5 |
| 3 | 76.5 | 7.62 | 32.5 | 12.5 | 32.5 | 12.5 |
| 3½ | 92.0 | 9.20 | 34.5 | 14.5 | 34.5 | 14.5 |
| 4 | $1.09 | 10.89 | 34.5 | 14.5 | 34.5 | 14.5 |
| 5 | 1.48 | 14.81 | 37.0 | 17.0 | 37.0 | 17.0 |
| 6 | 1.92 | 19.18 | 37.0 | 17.0 | 37.0 | 17.0 |

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain, N3; Youngstown Y1.

Columns C & D: Youngstown R2.

## BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

| O.D. In. | B.W. Ga. | —Seamless— H.R. | C.D. | Elec. Weld H.R. | C.D. |
|---|---|---|---|---|---|
| 1 | 13 | 13.45 | 16.47 | 15.36 | 15.36 |
| 1¼ | 13 | 16.09 | 19.71 | 15.61 | 18.19 |
| 1½ | 13 | 17.27 | 21.15 | 17.25 | 20.30 |
| 1¾ | 13 | 19.29 | 23.62 | 19.62 | 23.09 |
| 2 | 13 | 21.62 | 26.48 | 21.99 | 25.86 |
| 2¼ | 13 | 24.35 | 29.82 | 24.50 | 28.84 |
| 2½ | 12 | 26.92 | 32.97 | 26.98 | 31.76 |
| 2¾ | 12 | 29.65 | 36.32 | 29.57 | 34.76 |
| 2¾ | 12 | 32.11 | 39.33 | 31.33 | 36.84 |
| 3 | 12 | 34.00 | 41.64 | 32.89 | 38.70 |

## CLAD STEELS

(Cents per pound)

| Cladding Stainless | —Plates— Carbon Base 10% | 20% | —Strip— Cold-Rolled Carbon Base 10% | Both Sides | —Sheets— Carbon Base 10% | 20% | Cu Base Both Sides |
|---|---|---|---|---|---|---|---|
| 302 | .... | .... | .... | .... | 19.75 | 27.50 | 77.00 |
| 304 | 25.00 | 28.00–29.50 | .... | .... | 20.75–24.50 | 27.50 | 77.00 |
| 309 | 30.50 | 35.00 | .... | .... | .... | .... | .... |
| 310 | 36.50 | 41.00 | .... | .... | .... | .... | 144.00 |
| 316 | 29.50 | 31.50–34.00 | .... | .... | 26.00 | 36.50 | .... |
| 317 | 34.50 | 39.00 | .... | .... | .... | .... | .... |
| 318 | 38.50 | 38.00 | .... | .... | .... | .... | .... |
| 321 | 26.50 | 31.00 | .... | .... | 23.00 | 33.00 | 111.00 |
| 347 | 27.50 | 30.50–32.00 | .... | .... | 24.00 | 33.50 | 130.00 |
| 405 | 21.25 | 27.75 | .... | .... | .... | .... | .... |
| 410 | 20.75 | 27.25 | .... | .... | .... | .... | .... |
| Nickel. | 33.25 | 44.25 | 41.00 | 54.00 | .... | .... | .... |
| Inconel. | 41.00 | 53.50 | .... | .... | .... | .... | 165.00 |
| Monel | 34.75 | 45.75 | .... | .... | .... | .... | .... |
| Copper* | .... | .... | 23.70† | 29.65‡ | .... | .... | .... |

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

## BOLTS, NUTS

### CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ¾-in. ..... 18.5
- ⅞-in. and larger .... 17.5

Longer than 6 in.:
- All diams. ..... 14

Lag bolts, all diams.:
- 6 in. and shorter .... 23
- over 6 in. long ..... 21

Ribbed Necked Carriage 18.5
Blank ..... 34
Plow ..... 34
Step, Elevator, Tap, and Sleigh Shoe ..... 21
Tire bolts ..... 12
Boiler & Fitting-Up bolts 31

### NUTS

| H.P. & C.P. | Reg. | Heavy |
|---|---|---|
| Square: | | |
| ½-in. & smaller | 15 | 15 |
| ⅝-in. & ¾-in. | 12 | 6.5 |
| ⅞-in.-1⅛-in. | 9 | 1 |
| 1⅛ in. & larger | 7.5 | 1 |
| H.P. Hex.: | | |
| ½-in. & smaller | 26 | 22 |
| ⅝-in. & ¾-in. | 16.5 | 6.5 |
| ⅞-in.-1⅛-in. | 12 | 2 |
| 1⅛ in. & larger | 8.5 | 2 |
| C.P. Hex. | | |
| ½-in. & smaller | 26 | 22 |
| ⅝-in. & ¾-in. | 23 | 17.5 |
| ⅞-in. & 1⅛-in. | 19.5 | 12 |
| 1⅛-in. & larger | 12 | 6.5 |

### SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

| | Reg. | Hvy. |
|---|---|---|
| ½-in. & smaller | 35 | 28.5 |
| ⅝-in. & ¾-in. | 29.5 | 22 |
| ⅞-in.-1⅛-in. | 24 | 15 |
| 1⅛-in. & larger | 13 | 8.5 |
| | Light | |
| ½-in. & smaller | 35 | |
| ⅝-in. to ¾-in. | 28.5 | |
| ⅞-in. to 1⅛-in. | 26 | |

### STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish .....48 & 10
Plated finishes ...31 & 10

### HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller ..... 42
- ¾-in. through 1 in. .. 34

Longer than 6 in.:
- ⅝-in. & smaller ..... 26
- ¾-in. through 1 in. ... 4

### SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter ..... 38
1 in. and smaller diam. x over 6 in. ..... 26

### HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller .... 35
¼-in. diam. & larger.... 16
N.F. thread, all diams... 10

## RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.85c
7/16-in. under ..... 36 off

## WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..List to list-plus-50c.

## ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

### GRAPHITE

| Diam. | Inches Length | Cents per lb |
|---|---|---|
| 17,18,20 | 60,72 | 17.85 |
| 8 to 16 | 48,60,72 | 17.85 |
| 7 | 48,60 | 19.57 |
| 6 | 48,60 | 20.95 |
| 4,5½ | 40 | 21.50 |
| 3 | 40 | 22.61 |
| 2½ | 24,30 | 23.15 |
| 2 | 24,30 | 25.36 |

### CARBON

| | | |
|---|---|---|
| 40 | 100,110 | 8.03 |
| 35 | 100,110 | 8.03 |
| 30 | 84,110 | 8.03 |
| 24 | 72 to 104 | 8.03 |
| 17 to 20 | 34,90 | 8.03 |
| 14 | 60,72 | 8.57 |
| 10,12 | 60 | 8.84 |

## STAINLESS STEEL

| Type | Sheets | C.R. Strip | Bars Wire Structurals |
|---|---|---|---|
| 301 | 41.00 | 34.00 | 31.25 |
| 302 | 41.00 | 36.50 | 31.25 |
| 303 | 43.00 | 40.00 | 33.75 |
| 304 | 43.00 | 38.50 | 32.75 |
| 309 | 55.50 | 54.50 | 44.25 |
| 316 | 56.50 | 58.50 | 48.75 |
| 321 | 49.00 | 48.00 | 36.75 |
| 347 | 53.50 | 52.00 | 41.25 |
| 410 | 36.50 | 30.50 | 25.75 |
| 416 | 37.00 | 37.00 | 26.25 |
| 420 | 44.00 | 47.00 | 31.25 |
| 430 | 39.00 | 31.00 | 26.25 |
| 501 | 27.50 | 26.00 | 14.25 |
| 502 | 28.50 | 27.00 | 15.25 |

Baltimore, Types 301 through 347 sheet, except 309 E2.

Brackenridge, Pa., sheets A4.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.

Cleveland, strip A7.

Detroit, strip, except Types 309, 321, 416, 420, 501 and 502 M1.

Dunkirk, N.Y., bars, wire A4.

Duquesne, Pa., bars U5.

Fort Wayne, Ind., bars and wire, except Types 501 & 502 J6.

Gary, Ind., sheets except Type 416 U5.

Harrison, N. J., strip C18.

McKeesport, Pa., bars, sheets except Type 416 U5.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars U5.

Pittsburgh, sheets C18.

Reading, Pa., bars and strip, except 55.50c for Type 309 strip and 44.75c for Type 309 bars, C4.

Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.

So. Chicago, Ill., bars & structurals U5.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.

Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4.

Youngstown, strip, except Types 303, 309, 316, 416, 501 and 502 C8.

## COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol ....30.00-35.00
Toluol, one deg...26.00-33.00
Industrial xylol ..25.00-33.50

Per ton bulk, ovens
Sulphate of ammonia..$32-$45

Cents per pound, ovens
Phenol, 40 (carlots, non-returnable drums) ..17.25
Do., less than carlots..18.00
Do., tank cars .....15.50

## FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective $CaF_2$ content, 70%, $43; 60%, $40.

Imported, net ton, duty paid, metallurgical grade, $33-$35.

## METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

| | Cents |
|---|---|
| Sponge iron 98+% Fe, carlots.. | 16.00 |
| Swedish, c.l.f. New York, in bags | ...7.40-8.50 |
| Electrolytic Iron: Annealed, 99.5% Fe | 42.50 |
| Unannealed, 99 + % Fe | 36.50 |
| Unannealed, 99 + % Fe(minus 325 mesh) | 58.50 |
| Powder Flakes | 48.50 |
| Carbonyl Iron: 97.9-99.8%, size 5 to 10 microns. | .83.00-148.00 |
| Aluminum: Carlots, freight allowed | 29.50 |
| Atomized, 500 lb drums, freight allowed | 33.50 |
| Brass, 10-ton lots | 30.00-33.25 |
| Bronze, 10-ton lots | .51.25-60.00 |
| Phosphor-Copper, 10 tons | 50.00 |
| Copper: Electrolytic | 43.25 |
| Reduced | .33.75-37.00 |
| Lead | .25.50 |
| Magnesium | .75.00-85.00 |
| Manganese: Minus 100-mesh | 57.00 |
| Minus 35 mesh | 52.00 |
| Minus 200 mesh | 62.00 |
| Nickel unannealed | 83.00 |
| Nickel-Silver, 10-ton lots | 44.00 |
| Silicon | 38.50 |
| Solder (plus cost of metal) | 8.50 |
| Stainless Steel, 302 | 83.00 |
| Zinc, 10-ton lots | .23.00-30.50 |

| Tungsten: | Dollars |
|---|---|
| 99%, minus 80 to 200 mesh, freight allowed: 1000 lb and over | 4.00 |
| Less than 1000 lb | 4.15 |
| 98.8% minus 65 mesh, freight allowed: 1000 lb. and over | 4.15 |
| less than 1000 lb. | 4.25 |
| Molybdenum: 99%, minus 80 to 200 mesh, over 500 lb. | 2.85 |
| 200 to 500 lb. | 3.10 |
| less than 200 lb | 3.25 |
| Chromium, electrolytic 99% Cr min. | 3.50 |

## METALLURGICAL COKE

Price per net ton

### BEEHIVE OVENS

Connellsvll,fur. .$14.50-15.00
Connellsvll,fdry. .17.00-18.00
New River, foundry....21.30
Wise county, foundry..15.95
Wise county, furnace..15.20

### OVEN FOUNDRY COKE

Kearney, N. J., ovens..$22.75
Everett, Mass., ovens New England, del...*24.80
Chicago, ovens .....23.00
Chicago, del. .....24.40
Terre Haute, ovens.....22.50
Milwaukee, ovens ....23.75
Indianapolis, oven ....22.75
Chicago, del. .....26.28
Cincinnati, del. .....25.73
Detroit, del. .....26.71
Ironton, O., ovens ....22.50
Cincinnati, del. .....25.12
Painesville, O., ovens..24.00
Cleveland, del. .....25.75
Erie, Pa., ovens .....23.50
Birmingham, ovens ...20.30
Birmingham, del. ...21.69
Philadelphia, ovens ...22.70
NevilleIsland,Pa.,ovens 23.00
Swedeland, Pa., ovens..22.60
St. Louis, ovens St. Louis, del. .....25.40
Portsmouth, O., ovens..22.50
Cincinnati, del. .....25.12
Detroit, ovens .....24.00
Detroit, del. .....25.00
Buffalo, del. .....26.75
Flint, del. .....26.49
Pontiac, del. .....25.42
Saginaw, del. .....26.81

* Or within $4.15 freight zone from works.

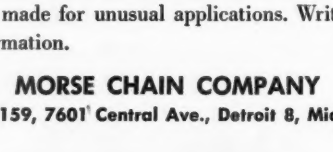
# MORSE DRIVE SHAFTS (in five series and three types)

**TRANSMIT POWER ECONOMICALLY RELIABLY WITHOUT LUBRICATION**

Flexible Morse Drive Shafts provide a cushioned drive between separated units. They provide torsional flexibility, absorb shock, and isolate vibration while transmitting power noiselessly, dependably, safely, and economically. Four of the five series accommodate end float *and* provide full universal action.

Look over the condensed descriptions of Morse Drive Shafts on this page. In addition to the standard sizes shown, special drive shafts can be made for unusual applications. Write us for more complete information.

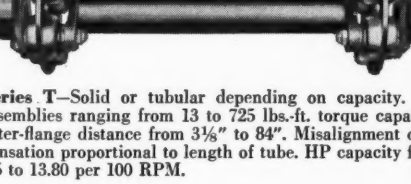
**MORSE CHAIN COMPANY**
**Dept. 159, 7601 Central Ave., Detroit 8, Michigan**



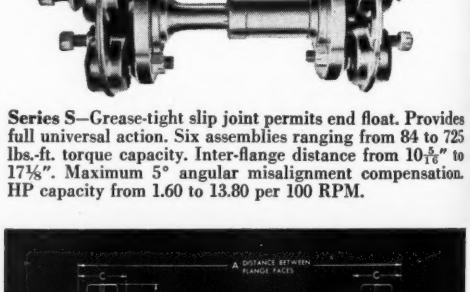
**Series RS (Radial Coupling Drive Shaft)**—Provides end float plus added capacity. Five assemblies ranging from 158 to 2127 lbs.-ft. torque capacity. Inter-flange distance from 10⅝" to 14⅝". HP capacity from 3 to 40½ per 100 RPM.

**Series RT**—Basically an RS Drive Shaft with tubular shaft welded to each end member to provide additional length. Five assemblies ranging from 158 to 2127 lbs.-ft. torque capacity. Inter-flange distance from 11⅛" to 84". HP capacity from 3 to 40½ per 100 RPM.

**Series T**—Solid or tubular depending on capacity. Ten assemblies ranging from 13 to 725 lbs.-ft. torque capacity. Inter-flange distance from 3⅛" to 84". Misalignment compensation proportional to length of tube. HP capacity from .25 to 13.80 per 100 RPM.



**Series S**—Grease-tight slip joint permits end float. Provides full universal action. Six assemblies ranging from 84 to 725 lbs.-ft. torque capacity. Inter-flange distance from 10$\frac{5}{16}$" to 17⅛". Maximum 5° angular misalignment compensation. HP capacity from 1.60 to 13.80 per 100 RPM.




**Series ST**—Basically a Series S Drive Shaft, with tubular shaft welded between hub and yoke members to provide additional length. Six assemblies ranging from 84 to 725 lbs.-ft. torque capacity. Inter-flange distance from 11$\frac{3}{16}$" to 84". Misalignment compensation proportional to length of tube. HP capacity from 1.60 to 13.80 per 100 RPM.

**M=PT**

**Morse *means* Power Transmission**

**MORSE**
**MECHANICAL *POWER TRANSMISSION* PRODUCTS**
PRODUCTS OF B-W BORG-WARNER

# WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

| | SHEETS | | | STRIP | | BARS | | | Standard Structural Shapes | PLATES | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | H.R. 18 Ga., Heavier* | C.R. | Gal. 10 Ga.† | H.R.* | C.R.* | H.R. Rds. | C.F. Rds. | H.R. Alloy 4140‡ | | Carbon | Floor |
| New York (city) | 6.27 | 7.29 | 8.44 | 6.59- | ... | 6.42 | 7.29 | 9.25 | 6.40 | 6.58 | 8.04 |
| New York (c'try) | 5.97 | 6.99 | 8.14 | 6.29 | ... | 6.12 | 6.99 | 8.95 | 6.10 | 6.28 | 7.74 |
| Boston (city) | 6.40 | 7.20 | 8.49 | 6.35 | ... | 6.25 | 7.04 | 9.25 | 6.40 | 6.98 | 7.88 |
| Boston (c'try) | 6.20 | 7.00 | 8.29 | 6.15 | ... | 6.05 | 6.84 | 9.05 | 6.20 | 6.78 | 7.68 |
| Phila. (city) | 7.15 | 7.05 | 8.25 | 6.35 | ... | 6.30 | 7.11 | 8.90 | 6.15 | 6.30 | 7.40 |
| Phila. (c'try) | 6.90 | 6.80 | 8.00 | 6.10 | ... | 6.05 | 6.86 | 8.65 | 5.90 | 6.05 | 7.15 |
| Balt. (city) | 5.80 | 7.04 | 8.27 | 6.24 | ... | 6.24 | 7.09 | ... | 6.34 | 6.00 | 7.64 |
| Balt. (c'try) | 5.60 | 6.84 | 8.07 | 6.04 | ... | 6.04 | 6.89 | ... | 6.14 | 5.80 | 7.44 |
| Norfolk, Va. | 6.50 | ... | ... | 6.70 | ... | 6.55 | 7.70 | ... | 6.60 | 6.50 | 8.00 |
| Richmond, Va. | 5.90 | ... | 8.10 | 6.10 | ... | 6.10 | 6.90 | ... | 6.30 | 6.05 | 7.80 |
| Wash. (w'hse) | 6.02 | 7.26 | 8.49 | 6.46 | ... | 6.46 | 7.26 | ... | 6.56 | 6.22 | 7.86 |
| Buffalo (del.) | 5.80 | 6.60 | 8.29 | 6.06 | ... | 5.80 | 6.65 | 10.65††§ | 6.00 | 6.25 | 7.55 |
| Buffalo (w'hse) | 5.60 | 6.40 | 8.09 | 5.86 | ... | 5.60 | 6.45 | 10.45††§ | 5.80 | 6.05 | 7.35 |
| Pitts. (w'hse) | 5.60 | 6.40§ | 7.75 | 5.65-5.95 | 6.90 | 5.55 | 6.40 | 10.10†† | 5.70 | 5.75 | 7.00 |
| Detroit (w'hse) | 5.45-5.78 | 6.53-6.80 | 7.99 | 5.94-5.95 | 7.75 | 5.84 | 6.56 | 8.91 | 6.09 | 6.19-6.35 | 7.28 |
| Cleveland (del.) | 5.80 | 6.60 | 8.30 | 5.89 | 7.10 | 5.77 | 6.60-6.70 | 8.91 | 10.02 | 6.12 | 7.32 |
| Cleve. (w'hse) | 5.60 | 6.40 | 8.10 | 5.69 | 6.90 | 5.57 | 6.40-6.50 | 8.71 | 5.82 | 5.92 | 7.12 |
| Cincin. (city) | 6.02 | 6.59 | 7.34 | 5.95 | ... | 5.95 | 6.51 | ... | 6.24 | 6.34 | 7.50 |
| Chicago (city) | 5.80 | 6.60 | 7.95 | 5.75 | ... | 5.75 | 6.50 | 10.30 | 5.90 | 6.00 | 7.20 |
| Chicago (w'hse) | 5.60 | 6.40 | 7.75 | 5.55 | ... | 5.55 | 6.30 | 10.10 | 5.70 | 5.80 | 7.00 |
| Milwaukee (city) | 5.94 | 6.74 | 8.09 | 5.89 | ... | 5.89 | 6.74 | 10.44 | 6.04 | 6.14 | 7.34 |
| Milwau. (c'try) | 5.74 | 6.54 | 7.89 | 5.69 | ... | 5.69 | 6.54 | 10.24 | 5.84 | 5.94 | 7.14 |
| St. Louis (del.) | 6.05 | 6.85 | 8.20 | 6.00 | ... | 6.00 | 6.85 | 10.55 | 6.23 | 6.33 | 7.53 |
| St. L. (w'hse) | 5.85 | 6.65 | 8.00 | 5.80 | ... | 5.80 | 6.65 | 10.35 | 6.03 | 6.13 | 7.33 |
| Kans. City (city) | 6.40 | 7.20 | 8.40 | 6.25 | ... | 6.35 | 7.20 | ... | 6.50 | 6.60 | 7.80 |
| KansCity (w'hse) | 6.20 | 7.00 | 8.20 | 6.15 | ... | 6.15 | 7.00 | ... | 6.30 | 6.40 | 7.60 |
| Omaha, Nebr. | 6.13‡ | ... | 8.33 | 6.13 | ... | 6.18 | 6.98 | ... | 6.18 | 6.38 | 7.83 |
| Birm'hm (city) | 5.75 | 6.55 | 6.90§ | 5.70 | ... | 5.70 | 7.53 | ... | 5.85 | 6.10 | 8.25 |
| Birm'hm, (w'hse) | 5.60 | 6.40 | 6.75§ | 5.55 | ... | 5.55 | 7.53 | ... | 5.70 | 5.95 | 8.23 |
| Los Ang. (city) | 6.55 | 8.10 | 9.05§ | 6.60 | 8.90 | 6.55 | 7.75 | ... | 6.55 | 6.60 | 9.20 |
| L. A. (w'hse) | 6.35 | 7.90 | 8.85§ | 6.40 | 8.70 | 6.35 | 7.55 | ... | 6.35 | 6.40 | 8.70 |
| San Francisco | 6.65 | 7.80§ | 8.90§ | 6.60 | ... | 6.45 | 8.20 | ... | 6.45 | 6.50 | 8.60 |
| Seattle-Tacoma | 7.05 | 8.60§ | 9.20§ | 7.30 | ... | 6.75 | 9.10 | 11.15 | 6.65 | 6.75 | 8.80 |

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded; ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; 2—500 to 1499 lb; 3—450 to 1499 lb; 4—3500 lb and over; 5—1000 to 1999 lb.

## ORES

**Lake Superior Iron Ore**

Gross ton, 51½% (natural), lower lake ports. After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

| | |
|---|---|
| Old range bessemer | $8.70 |
| Old range nonbessemer | 8.55 |
| Mesabi bessemer | 8.45 |
| Mesabi nonbessemer | 8.30 |
| High phosphorus | 8.30 |

**Eastern Local Ore**

Cents per unit, del. E. Pa.

| | |
|---|---|
| Foundry and basis 56-62% concentrates contract | 17.00 |

**Foreign Ore**

Cents per unit, c.i.f. Atlantic ports

| | |
|---|---|
| Swedish basic, 60 to 68%: | |
| Spot | 17.00 |
| Long-term contract | 15.00 |
| North African hematites | 15.75 |
| Brazilian iron ore, 68-69% | 18.00 |

**Tungsten Ore**

Net ton unit, duty paid

| | |
|---|---|
| Foreign woiframite and scheelite, per net ton unit | $65.00 |
| Domestic scheelite, mines | 65.00 |

**Manganese Ore**

Indian manganese, 46-48%, nearby, 92.00-96.00c per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

**Chrome Ore**

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

*Indian and African*

| | |
|---|---|
| 48% 2.8:1 | $32.50 |
| 48% 3:1 | 35.00-36.00 |
| 48% no ratio | 26.00 |

*South African Transvaal*

| | |
|---|---|
| 44% no ratio | $27.00-28.00 |
| 45% no ratio | 20.00 |
| 48% no ratio | 34.00-35.00 |
| 50% no ratio | 28.00-28.50 |

*Brazilian*

| | |
|---|---|
| 44% 2.5:1 lump | $32.00 |

*Rhodesian*

| | |
|---|---|
| 45% no ratio | $20.00-21.00 |
| 48% no ratio | 26.00 |
| 48% 3:1 lump | 35.00-36.00 |

Domestic—rail nearest seller

| | |
|---|---|
| 48% 3:1 | $39.00 |

**Molybdenum**

| | |
|---|---|
| Sulphide concentrates per lb, molybdenum content, mines | $1.00 |

## SILICON ALLOYS

**25-30% Ferrosilicon:** Contract, carload, lump, bulk, 20.00c per lb of contained Si; packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

**50% Ferrosilicon:** Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

**Low-Aluminum 50% Ferrosilicon:** (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

**75% Ferrosilicon:** Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered. Spot, add 0.8c.

**Low-Aluminum 85% Ferrosilicon:** (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

**90-95% Ferrosilicon:** Contract, carload, lump, bulk, 17.5c per lb of contained Si, carload packed 18.7c, ton lot 19.65c, less ton 20.7c. Delivered. Spot, add 0.25c.

**Alsifer:** (Approx. 20% Al, 40% Si, 40% Fe.) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.90c per lb of alloy, ton lots packed 11.30c, 200 to 1999 lb 11.65c, smaller lots 12.15c.

## BORON ALLOYS

**Ferroboron:** (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

**Borosil:** (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

**Bortam:** (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

**Carbortam:** (B 1 to 2%) contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

## TUNGSTEN ALLOYS*

**Ferrotungsten:** (70-80%). 10,000 lb W or more, $5.00 per lb of contained W 2000 lb W to 10,000 lb W, $5.10; less than 2000 lb W, $5.22.

**Tungsten Powder:** Carbon Reduced; (W 98.8% min.) 1000 lb or more, $6.00 per lb of contained W; less than 1000 lb W, $6.15.

**Government ceiling prices, effective May 7, 1951, f.o.b. Niagara Falls, N. Y., basis.*

*NOTE: Current prices on manganese, titanium and chromium alloys appeared on page 147, Apr. 16 issue; calcium, vanadium, zirconium, briquetted alloys and "other" ferroalloys, page 163, Apr. 9 issue.*

## REFRACTORIES

**Fire Clay Brick**

*Super Duty:* St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Hayward, Ashland, Ky., Clearfield, Curwensville, Pa., Ottawa, Ill., $116.60. Hard-fired, St. Louis, Vandalia, Mo., Olive Hill, Ky., $156.20.

*High-Heat Duty:* Salina, Pa., $99.60. Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, Curwensville, Lumber, Lockhaven, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Bessemer, Ala., Portsmouth, Oak Hill, O., Ottawa, Ill., $94.60.

*Intermediate-Heat Duty:* St. Louis, Farber, Vandalia, Mo., West Decatur, Orviston, Beach Creek, Curwensville, Lumber, Lockhaven, St. Marys, Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Hayward, Ky., Athens, Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $88; Bessemer, Ala., $79.20.

*Low-Heat Duty:* Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., $79.20; Parral, O., $78.50; St. Marys, Pa., $76; Ottawa, Ill., $70.

**Ladle Brick**

*Dry Press:* Chester, New Cumberland, W. Va., Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., $66.

*Wire Cut:* Chester, Wellsville, O., $64.

**Malleable Bung Brick**

St. Louis, Vandalia, Farber, Mo., Olive Hill, Ky., $105.60; Beach Creek, Pa., $94.60; Ottawa, Ill., $90.

**Silica Brick**

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $94.60; Hays, Pa., $100.10; Joliet, Rockdale, Ill., E. Chicago, Ind., $104.50; Lehi, Utah, Los Angeles, $111.10.

*Eastern Silica Coke Oven Shapes* (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $92.40.

*Illinois Silica Coke Oven Shapes* (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $93.50.

**Basic Brick**

Per net ton, Baltimore or Chester, Pa. Burned chrome brick, $73-$78; chemical-bonded chrome brick, $77-$82; magnesite brick, $99-$104; chemical-bonded magnesite, $88-$93.

**Magnesite**

Per net ton, Chewelah, Wash. Domestic deadburned, ⅜" grains; bulk, $36.30; single paper bags, $41.80.

**Dolomite**

Per net ton. Domestic burned bulk; Bonne Terre, Mo., $12.15; Martin, Millersville, Narlo, Clay Center, Woodville, Gibsonburg, Bettsville, O., Billmeyer, Plymouth Meeting, Blue Bell, Williams, Pa., Millville, W. Va., $13.

# CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, as amended Apr. 19, 1951

## STEELMAKING SCRAP COMPOSITE

| | |
|---|---|
| May 10 | $44.00 |
| May 3 | 44.00 |
| Apr. 1951 | 44.00 |
| May 1950 | 33.82 |
| Apr. 1946 | 19.17 |

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

**Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin; and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.**

**No. 1 Heavy Melting Steel (Grade )1**

| Basing Point | Dealer, Industrial | Railroad |
|---|---|---|
| Alabama City, Ala. | $39.00 | $41.00 |
| Ashland, Ky. | 42.00 | 44.00 |
| Atlanta, Ga. | 39.00 | 41.00 |
| Bethlehem, Pa. | 42.00 | 44.00 |
| Birmingham, Ala. | 39.00 | 41.00 |
| Brackenridge, Pa. | 44.00 | 46.00 |
| Buffalo, N. Y. | 43.00 | 45.00 |
| Butler, Pa. | 44.00 | 46.00 |
| Canton, O. | 44.00 | 46.00 |
| Chicago, Ill. | 42.50 | 44.50 |
| Cincinnati, O. | 43.00 | 45.00 |
| Claymont, Del. | 42.50 | 44.50 |
| Cleveland, O. | 43.00 | 45.00 |
| Coatesville, Pa. | 42.50 | 44.50 |
| Conshohocken, Pa. | 42.50 | 44.50 |
| Detroit, Mich. | 41.15 | 43.15 |
| Duluth, Minn. | 40.00 | 42.00 |
| Harrisburg, Pa. | 42.50 | 44.50 |
| Houston, Tex. | 37.00 | 39.00 |
| Johnstown, Pa. | 44.00 | 46.00 |
| Kansas City, Mo. | 39.50 | 41.50 |
| Kokomo, Ind. | 42.00 | 44.00 |
| Los Angeles | 35.00 | 37.00 |
| Middletown, O. | 43.00 | 45.00 |
| Midland, Pa. | 44.00 | 46.00 |
| Minnequa, Colo. | 38.00 | 40.00 |
| Monessen, Pa. | 44.00 | 46.00 |
| Phoenixville, Pa. | 42.50 | 44.50 |
| Pittsburg, Calif. | 35.00 | 37.00 |
| Pittsburgh, Pa. | 44.00 | 46.00 |
| Portland, Oreg. | 35.00 | 37.00 |
| Portsmouth, O. | 42.00 | 44.00 |
| St. Louis, Mo. | 41.00 | 43.00 |
| San Francisco | 35.00 | 37.00 |
| Seattle, Wash. | 35.00 | 37.00 |
| Sharon, Pa. | 44.00 | 46.00 |
| Sparrows Point, Md. | 42.00 | 44.00 |
| Steubenville, O. | 44.00 | 46.00 |
| Warren, O. | 44.00 | 46.00 |
| Weirton, W. Va. | 44.00 | 46.00 |
| Youngstown, O. | 44.00 | 46.00 |

### Differentials from Base

Differentials per gross ton for other grades of dealer and industrial scrap:

| | |
|---|---|
| **O-H and Blast Furnace Grades** | |
| 2. No. 2 Heavy Melting | —$2.00 |
| 3. No. 1 Busheling | Base |
| 4. No. 1 Bundles | Base |
| 5. No. 2 Bundles | — 3.00 |
| 6. Machine Shop Turnings | —10.00 |
| 7. Mixed Borings & Short Turnings | — 6.00 |
| 8. Shoveling Turnings | — 6.00 |
| 9. No. 2 Busheling | — 4.00 |
| 10. Cast Iron Borings | — 6.00 |
| **Elec. Furnace and Fdry. Grades** | |
| 11. Billet, Bloom & Forge Crops | + 7.50 |
| 12. Bar Crops & Plate | + 5.00 |
| 13. Cast Steel | + 5.00 |
| 14. Punchings & Plate Scrap | + 2.50 |
| 15. Electric Furnace Bundles | + 2.00 |
| Cut Structurals & Plate: | |
| 16. 3 feet and under | + 3.00 |
| 17. 2 feet and under | + 5.00 |
| 18. 1 foot and under | + 6.00 |
| 19. Briquetted Cast Iron Borings | Base |
| Foundry Steel: | |
| 20. 2 feet and under | + 2.00 |
| 21. 1 foot and under | + 4.00 |
| 22. Springs and Crankshafts | + 1.00 |
| 23. Alloy Free Turnings | — 3.00 |
| 24. Heavy Turnings | — 1.00 |
| **Special Grades** | |
| 25. Briquetted Turnings | Base |
| 26. No. 1 Chemical Borings | — 3.00 |
| 27. No. 2 Chemical Borings | — 4.00 |
| 28. Wrought Iron | +10.00 |
| 29. Shafting | +10.00 |

### Restrictions on Use

(1) Prices for Grades 11 and 23 may be charged only when shipped to a consumer directly from an industrial producer; otherwise ceiling prices shall not exceed prices established for Grades 12 and 8, respectively.
(2) Prices established for Grades 26 and 27 may be charged only when sold for use for chemical or annealing purposes, and in the case of Grade 27, for briquetting and direct charge into an electric furnace; otherwise ceiling prices shall not exceed price established for Grade 10.
(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price shall not exceed ceiling price for corresponding grade of basic open-hearth.
(4) Premiums for Grades 11-18, 20 and 21 may be charged only when sold for use in electric and open-hearth furnaces or foundries.
(5) Prices for Grade 29 may be charged only when sold for forging or rerolling purpose.

### Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering.
(2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size, shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $6; 75% and over, $10; less than 75%, $12.
(3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 heavy melting steel less $15.

### Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap.

| | |
|---|---|
| 2. No. 2 Heavy Melting Steel | —$2.00 |
| 3. No. 2 Steel Wheels | Base |
| 4. Hollow Bored Axles and loco. axles with keyways between the wheelseats | Base |
| 5. No. 1 Busheling | — 3.50 |
| 6. No. 1 Turnings | — 3.00 |
| 7. No. 2 Turnings, Drillings & Borings | —12.00 |
| 8. No. 2 Cast Steel and uncut wheelcenters | — 6.00 |
| 9. Uncut Frogs, switches | Base |
| 10. Flues, Tubes & Pipes | — 8.00 |
| 11. Structural, Wrought Iron and/or steel, uncut | — 6.00 |
| 12. Destroyed Steel Cars | — 8.00 |
| 13. No. 1 Sheet Scrap | — 9.50 |
| 14. Scrap Rails, Random Lengths | + 2.00 |
| 15. Rerolling Rails | + 7.00 |
| Cut Rails: | |
| 16. 3 feet and under | + 5.00 |
| 17. 2 feet and under | + 6.00 |
| 18. 18 inches and under | + 8.00 |
| 19. Cast Steel, No. 1 | + 3.00 |
| 20. Uncut Tires | + 2.00 |
| 21. Cut Tires | + 5.00 |
| Bolsters & Side Frames | |
| 22. Uncut | Base |
| 23. Cut | + 3.00 |
| 24. Angle, Splice Bars & Tie Plates | + 5.00 |
| 25. Solid Steel Axles | +12.00 |
| 26. Steel Wheels, No. 3 oversize | Base |
| 27. Steel Wheels, No. 3 | + 5.00 |
| 28. Spring Steel | + 5.00 |
| 29. Couplers & Knuckles | + 5.00 |
| 30. Wrought Iron | + 8.00 |
| 31. Fireboxes | — 8.00 |
| 32. Boilers | — 6.00 |
| 33. No. 2 Sheet Scrap | —13.00 |
| 34. Carsides, Doors, Car Ends, cut apart | — 6.00 |

### Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling shall not exceed that for Grade 14.
(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling shall not exceed that for No. 1 heavy melting steel.
(3) Price for Grade 25 may be charged only when sold for rerolling and forging purposes; otherwise ceiling shall not exceed that for base grade (No. 1).

## CAST IRON SCRAP

Ceiling price per gross ton for following grades shall be f.o.b. shipping point:

| | | |
|---|---|---|
| Cast Iron: | | |
| 1. | No. 1 (Cupola) | $49.00 |
| 2. | No. 2 (Charging Box) | 47.00 |
| 3. | No. 3 (Hvy. Breakable) | 45.00 |
| 4. | No. 4 (Burnt Cast) | 41.00 |
| 5. | Cast Iron Brake Shoes | 41.00 |
| 6. | Stove Plate | 46.00 |
| 7. | Clean Auto Cast | 52.00 |
| 8. | Unstripped Motor Blocks | 43.00 |
| 9. | Wheels, No. 1 | 47.00 |
| 10. | Malleable | 55.00 |
| 11. | Drop Broken Machinery | 52.00 |

### Restrictions on Use

(1) Ceiling shipping point price which a basic open-hearth consumer may pay for No. 1 cast iron, clean auto cast, malleable or drop broken machinery cast shall be ceiling price for No. 3 cast iron.

(2) Ceiling shipping point price which any foundry other than a malleable iron producer may pay for Grade 10 shall be ceiling price for No. 1 cast iron.

### Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin authorized by OPS are:

(1) For preparing into Grades No. 1, No. 2 or No. 3, $8.
(2) For hydraulically compressing Grade No. 4, $6 per ton; Grade No. 5, $8.
(3) For crushing Grade No. 6, $3.
(4) For preparing into Grade No. 25, $6.
(5) For preparing into Grade No. 19, $6.
(6) For preparing into Grades No. 12, No. 13, No. 14, No. 16, or No. 20, $10.
(7) For preparing into Grade No. 17 or Grade No. 21, $11.
(8) For preparing into Grade No. 18 or Grade No. 20, $12.
(9) For hydraulically compressing Grade No. 15, $8.
(10) For preparing into Grade No. 23, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be:

(1) For preparing into Grade No. 1 and Grade No. 2, $8.
(2) For hydraulically compressing Grade No. 13, $6.
(3) For preparing into Grade No. 16, $4.
(4) For preparing into Grade No. 17, $5.
(5) For preparing into Grade No. 18, $7.
(6) For preparing into Grade No. 21, $4.
(7) For preparing into Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron are limited to:

(1) For preparing Grade No. 8 into grade No. 7, $9.
(2) For preparing Grade No. 3 into Grade No. 11, $7.
(3) For preparing Grade No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless consumer obtains prior written OPS approval.

No preparation charge in excess of charges set forth above may be made for preparation of any grade of scrap unless the consumer has secured prior written OPS approval.

### Commissions

No commissions shall be payable to a broker in excess of $1.

### Unprepared Scrap

The term "unprepared scrap" shall have its customary trade meaning.

For unprepared scrap, other than materials suitable for hydraulic compression, ceiling basing point prices shall be $8 per ton beneath ceiling of the prepared base grades.

For unprepared material which when compressed constitutes No. 1 bundles, ceiling basing point price shall be $6 per ton beneath ceiling for No. 1 bundles; or when compressed constitutes No. 2 bundles ceiling basing point price shall be $8 beneath ceiling basing point price for No. 2 bundles.

Any iron casting which cannot be broken with an ordinary drop into Grade No. 1 or No. 2 may not be classified as Grade No. 3. Where such iron casting requiring blasting or other special preparation is sold to a consumer, the shipping point price for Grade No. 3 must be reduced by amount of additional charges required for preparation.

### Special Pricing Provision

Ceiling price of clean cast iron foundry runouts, spills, or cupola drops prepared by cleaning or breaking is 75% of corresponding cast iron grade.

### Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100.

### Switching Charges

Switching charges to be deducted from basing point prices of dealer, industrial and nonoperating railroad scrap, to determine ceiling shipping point prices for scrap originating in basing points are per gross ton:

Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.
Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 53c; Buffalo, 83c; Butler, Pa., 65c.
Canton, O., 51c; Chicago (including Gary, Ind.), $1.34; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.
Coatesville, Pa., 50c; Conshohocken, Pa., 20c.
Detroit, 95c; Duluth, Minn., 50c.
Harrisburg, Pa., 51c; Houston, Tex., 57c.
Johnstown, Pa., 75c.
Kansas City, Mo., 78c; Kokomo, Ind., 51c.
Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo., 33c; Monessen, Pa., 51c.
Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.
St. Louis (including Federal, Granite City, E. St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 20c; Steubenville, O., 51c.
Warren, Pa., 75c; Weirton, W. Va., 70c.
Youngstown, 75c.

# *Help Keep the* SCRAP CYCLE *in HIGH GEAR for Top Level Steel Production*

The "heart" of your sheet-steel salvaging program is your baling equipment. It should be adequate to handle your daily accumulation of sheet steel scrap efficiently at low cost-per-ton. Then you can show a profit on your salvaging operations while contributing your share to the rapidly expanding production of new steel in the years ahead.

Large G-H Balers, properly designed and ruggedly constructed, hold to a minimum the cost-per-ton of baled sheet steel scrap. Galland-Henning engineers, with a background of many years' experience in this field, offer you competent counsel on your scrap baling operations. Consult them NOW regarding modernization or expansion of your baling facilities to meet future needs.

Typical views of G-H Baler operations in large metal-working plants.

**GALLAND-HENNING MFG. CO.**
**2747 South 31st St. • Milwaukee 46, Wis.**

# GALLAND-HENNING

## SCRAP METAL BALING PRESSES

A 5921-1P

# The Metal Market

**Trading in nonferrous metals on black market gains as consumers fail to get required tonnages with DO ratings. Chilean copper price rises 3 cents; tin declines a like amount**

MARKET on DO ratings is bearish. Their value is diminishing rapidly because they no longer give assurance that you will receive the full tonnage called for in orders carrying that symbol. The volume of orders for nonferrous metals carrying this rating are increasing and exceeds by a large margin the set-aside required under NPA orders. CMP is expected to correct the situation so far as copper and aluminum are concerned.

Being unable to obtain sufficient tonnages from their regular suppliers, an increasing number of consumers are patronizing the black market. Consumers who refuse to deal through irregular channels are being penalized by this practice. K. T. Keller, chairman, Chrysler Corp., says deals for copper, lead, zinc and nickel are being made at 100 per cent over quoted market values.

The stringency in slab zinc continues with the smelters' unfilled orders approximating their monthly production, or about 77,500 tons. With shipments restricted to new supplies, stocks are holding at about 14,500 tons. The shortage in lead is attributed to the drop in imports. The United States is importing at a rate of 200,000 tons less than a year ago.

The United States has agreed to let Chile raise her copper price to this country by 3 cents. As a result, the New York delivered price of Chilean copper will advance to 27.50c a pound. Priority will be given to Chile's needs for new copper mining equipment in order to enable her to expand production.

Reconstruction Finance Corp. reduced its tin price 3 cents a pound on Thursday to $1.39 a pound. Officials refused to comment on this action.

## Tightens Nickel Restrictions

Requirements for nickel for defense-rated orders and essential defense-supporting uses exceed the available supply. As a result, National Production Authority has taken a further step toward complete allocation of nickel under a melt-sheet-and-process control program on end-uses that will go into effect June 1.

NPA has directed the distribution of nickel supplies to balance the requirements of defense, defense-supporting and civilian users of the strategic metal. The agency issued a directive instructing the sole supplier to make the following disposition of nickel available for delivery in May:

Furnish not more than 60 per cent of the amount of nickel called for in defense rated orders; deliver not more than 15 per cent of the monthly average base period consumption to civilian users; reserve the balance to be distributed under direction of NPA.

Nickel will be made available to the receiving tube industry during May and June in quantities sufficient to permit limited production of this important item of communications equipment. Nickel allotments to the industry will total 200,000 pounds in May and 180,000 pounds in June.

## Plans Zinc-Lead Smelter

Zinc and lead deposit at Salmo, B. C., has reached a stage which justifies full operation, says R. E. Stavert, president, Consolidated Mining & Smelting Co. of Canada Ltd., Montreal. Work has begun on installation of mining and milling equipment for the production and treatment of 1000 tons of ore a day. About $2.7 million is being invested in mine equipment.

## Aluminum Production Rises

Production of primary aluminum in the United States increased 5 per cent during the first quarter over the total for the last quarter of 1950. The industry turned out 140,044,429 pounds of primary metal in March, to bring the quarterly total to 401,431,462 pounds compared with 382,176,940 pounds for the previous quarter.

"This is about 25 per cent more than was produced during the first quarter of 1950," said Donald M. White, secretary, Aluminum Association, New York. "It reflects," White added, "the industry's continuous efforts during the year to increase its production. Nevertheless, the combined military and civilian demand is still much greater than the available supply."

Aluminum sheet and plate shipped by member companies of the Association's Sheet Division aggregatetd 99,965,985 pounds in March, bringing the quarterly total to 306,771,995 pounds. "This represents a drop of about 1 per cent from the 310,149,800 pounds shipped during the last quarter of 1950, but marks an advance of 18 per cent above the shipments during the first quarter of last year," Mr. White added.

## National Lead Gets Contract

Contract-operator of Atomic Energy Commission's Feed Materials Production Center will be National Lead Co., New York. The Center, to be constructed on a 1200-acre site near the Miami river, 19 miles northwest of downtown Cincinnati, will include a uranium ore refinery and other facilities for the production of uranium in forms suitable for use at the commission's fissionable materials production plants.

## Alcoa Doubles Mill Output

Aluminum Co. of America's rod, wire and cable mill in Vancouver, Wash., has inaugurated a 24-hour daily work schedule, doubling output for defense orders.

## Boosts Aluminum Foil Output

Kaiser Aluminum & Chemical Corp., which began making aluminum foil at its Permanente, Calif., plant in 1948, utilizing a mill once used in Germany, now is producing foil at the rate of 5000 tons a year. This is double the rate obtained during the first year of operation. Considerable amount of the foil is going to the military—for "chaff" (used for radar interference) and for condenser foil.

## Zinc Scarcity Forces Bulge in Order Backlogs

# NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

## Primary Metals

**Copper:** Electrolytic 24.50c. Conn. Valley; Lake 24.62½c, delivered.

**Brass Ingots:** 85-5-5-5 (No. 115) 29.00c; 88-10-2 (No. 215) 44.50c; 80-10-10 (No. 305) 35.00; No. 1 yellow (No. 405) 25.50c.

**Zinc:** Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.85c, delivered.

**Lead:** Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

**Primary Aluminum:** 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

**Secondary Aluminum:** Piston alloys 30.75-32.50c; No. 12 foundry alloy (No. 2 grade) 30.75-31.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 32.75-33.50c; grade 2, 30.00-31.50c; grade 3, 30.00-30.50c; grade 4, 28.50-30.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

**Magnesium:** Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

**Tin:** Grade A, prompt 142.00.

**Antimony:** American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 42.50c; f.o.b. Laredo, Tex., for bulk shipments.

**Nickel:** Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 50.50c; 25-lb pigs, 53.15c; "XX" nickel shot, 54.15c; "F" nickel shot or ingots, for addition to cast iron, 51.00c. Prices include import duty.

**Mercury:** Open market, spot, large lots, New York, $215-$220 per 76-lb flask.

**Beryllium-Copper:** 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

**Cadmium:** "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

**Cobalt:** 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

**Gold:** U. S. Treasury, $35 per ounce.

**Silver:** Open market, New York 90.16c per oz.

**Platinum:** $90-$93 per ounce from refineries.

**Palladium:** $24 per troy ounce.

**Iridium:** $200 per troy ounce.

**Titanium (sponge form):** $5 per pound.

## Rolled, Drawn, Extruded Products

### COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

**Sheet:** Copper 41.03; yellow brass 37.84; commercial bronze, 95%, 40.99; 90%, 40.55; red brass, 85%, 39.59; 80%, 39.15; best quality, 39.15; nickel silver, 18%, 51.91-52.36; phosphor-bronze grade A, 5%, 60.20-62.82.

**Rod:** Copper, hot-rolled 36.88; cold-drawn 38.13; yellow brass free cutting, 32.23; commercial bronze, 95%, 40.68; 90%, 40.24; red brass 85%, 39.28; 80%, 38.84.

**Seamless Tubing:** Copper 41.07; yellow brass 40.85; commercial bronze, 90%, 43.21; red brass, 85% 42.50.

**Wire:** Yellow brass 38.13; commercial bronze, 95%, 41.28; 90%, 40.84; red brass, 85%, 39.88; 80%, 39.44; best quality brass, 39.44.

**Copper Wire:** Bare, soft, f.o.b. eastern mills, c.l. 28.67-30.295; l.c.l. 29.17-30.92; 100,000 lb lots 28.545-30.295; weatherproof, f.o.b. eastern mills, c.l. 30.10, l.c.l. 30.18, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

### ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

**Sheets and Circles:** 2S and 3S mill finish c.l.

| Thickness Range Inches | Widths or Diameters, In., Incl. | Flat Sheet Base* | Coiled Sheet Base | Coiled Sheet Circle† Base |
|---|---|---|---|---|
| 0.249-0.136 | 12-48 | 30.1 | ... | ... |
| 0.135-0.096 | 12-48 | 30.6 | ... | ... |
| 0.095-0.077 | 12-48 | 31.2 | 29.1 | 33.2 |
| 0.076-0.061 | 12-48 | 31.8 | 29.3 | 33.4 |
| 0.060-0.048 | 12-48 | 32.1 | 29.5 | 33.7 |
| 0.047-0.038 | 12-48 | 32.5 | 29.8 | 34.0 |
| 0.037-0.030 | 12-48 | 32.9 | 30.2 | 34.6 |
| 0.029-0.024 | 12-48 | 33.4 | 30.5 | 35.0 |
| 0.023-0.019 | 12-36 | 34.0 | 31.1 | 35.7 |
| 0.018-0.017 | 12-36 | 34.7 | 31.7 | 36.6 |
| 0.016-0.015 | 12-36 | 35.5 | 32.4 | 37.6 |
| 0.014 | 12-24 | 36.5 | 33.3 | 38.9 |
| 0.013-0.012 | 12-24 | 37.4 | 34.0 | 39.7 |
| 0.011 | 12-24 | 38.4 | 35.0 | 41.2 |
| 0.010-0.0095 | 12-24 | 39.4 | 36.1 | 42.7 |
| 0.009-0.0085 | 12-24 | 40.6 | 37.2 | 44.4 |
| 0.008-0.0075 | 12-24 | 41.9 | 38.4 | 46.1 |
| 0.007 | 12-18 | 43.3 | 39.7 | 48.2 |
| 0.006 | 12-18 | 44.8 | 41.0 | 52.8 |

* Lenghts 72 to 180 inches. † Maximum diameter, 26 inches.

**Screw Machine Stock:** 5000 lb and over.

| Diam. (in.) or distance across flats | —Round— R317-T4, 17S-T4 | R317-T4 | —Hexagonal— 17S-T4 |
|---|---|---|---|
| 0.125 | 52.0 | ... | ... |
| 0.156-0.188 | 44.0 | ... | ... |
| 0.219-0.313 | 41.5 | ... | ... |
| 0.375 | 40.0 | 46.0 | 48.0 |
| 0.406 | 40.0 | ... | ... |
| 0.438 | 40.0 | 46.0 | 48.0 |
| 0.469 | 40.0 | ... | ... |
| 0.500 | 40.0 | 46.0 | 48.0 |
| 0.531 | 40.0 | ... | ... |
| 0.563 | 40.0 | ... | 45.0 |
| 0.594 | 40.0 | ... | ... |
| 0.625 | 40.0 | 43.5 | 45.0 |
| 0.688 | 40.0 | ... | 45.0 |
| 0.750-1.000 | 39.0 | 41.0 | 42.5 |
| 1.063 | 39.0 | ... | 41.0 |
| 1.125-1.500 | 37.5 | 39.5 | 41.0 |
| 1.563 | 37.0 | ... | ... |
| 1.625 | 36.5 | ... | 39.5 |
| 1.688-2.000 | 36.5 | ... | ... |

### LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

### ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

### "A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled, 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

### MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip, cold-rolled 60.00c. Rods and shapes, 55.00c. Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

### MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

### TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

## Plating Materials

**Chromic Acid:** 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

**Copper Anodes:** Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 37.69c; oval 37.19c. Cast 37.375c, delivered in eastern territory.

**Copper Cyanide:** 70-71% Cu, 100-lb drums, 1000 lb 60.8c, under 1000 lb 62.8c, f.o.b Niagara Falls, N. Y.

**Sodium Cyanide:** 96-98% ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

**Copper Carbonate:** 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

**Nickel Anodes:** Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c, 500 to 3000 lb 71.50c; 100 to 500 lb, 73.50c; under 100 lb, 76.50c; f.o.b. Cleveland.

**Nickel Chloride:** 100-lb keg, 35.00c; 400-lb bbl. 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

**Tin Anodes:** Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.

**Sodium Stannate:** 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

**Zinc Cyanide:** 100 lb drums, less than 10 drums 47.7c, 10 or more drums, 45.7c, f.o.b. Niagara Falls, N. Y.

**Stannous Sulphate:** 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.

**Stannous Chloride (Anhydrous):** In 400 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

## Scrap Metals

### BRASS MILL ALLOWANCES

Prices in cents per pound for less than 20,000 lb, f.o.b. shipping point.

| | Clean Heavy | Rod Ends | Clean Turnings |
|---|---|---|---|
| Copper | 23.00 | 23.00 | 22.25 |
| Yellow Brass | 20.125 | 19.875 | 18.75 |
| Commercial Bronze | | | |
| 95% | 21.875 | 21.625 | 21.125 |
| 90% | 21.75 | 21.50 | 21.00 |
| Red Brass | | | |
| 85% | 21.50 | 21.25 | 20.75 |
| 80% | 21.375 | 21.125 | 20.625 |
| Muntz metal | 19.00 | 18.75 | 18.25 |
| Nickel, silver, 10% | 22.25 | 22.00 | 11.125 |
| Phos. bronze, A | 24.00 | 23.75 | 22.75 |

### BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 30.00; No. 2 copper 28.00; light copper 27.00; composition red brass 25.50-26.00; radiators 20.50-21.00; heavy yellow brass 20.00-20.50.

### REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 20.00.

* Nominal.

### DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

**Copper and brass:** Heavy copper and wire, No. 1 25.50-26.50; No. 2 24.00-25.00; light copper 22.00-22.50; No. 1 composition red brass 22.00-23.00; No 1 composition turnings 21.00-22.00; mixed brass turnings 13.00; new brass clippings 20.00-21.00; No. 1 brass rod turnings 19.00; light brass 15.00; clean heavy yellow brass 17.50; new brass rod ends 19.50; auto radiators 17.50-18.00; cocks and faucets, 19.00-19.50; brass pipe 20.00-20.50.

**Lead:** Heavy 16.50-16.75; battery plates 9.50-10.00; linotype and stereotype 17.00; electrotype 15.75-16.00; mixed babbitt 17.00.

**Zinc:** Old zinc 12.50-13.00; new die cast scrap 12.50-13.00; old die cast scrap 8.25-8.50.

**Tin:** No. 1 pewter 80.00-85.00; block tin pipe 110.00-120.00; No. 1 babbitt 70.00-75.00.

**Aluminum:** Clippings 2S 21.50-22.00; old sheets 17.00-17.50; crankcase 17.00-17.50; borings and turnings 13.00-14.000.

## DAILY PRICE RECORD

| 1951 | Copper | Lead | Zinc | Tin | Aluminum | Antimony | Nickel | Silver |
|---|---|---|---|---|---|---|---|---|
| May 10 | 24.50 | 16.80 | 17.50 | 139.00 | 19.00 | 42.00 | 50.50 | 90.16 |
| May 1-9 | 24.50 | 16.80 | 17.50 | 142.00 | 19.00 | 42.00 | 50.50 | 90.16 |
| Apr. 17-30 | 24.50 | 16.80 | 17.50 | 142.00 | 19.00 | 42.00 | 50.50 | 90.16 |
| Apr. 12-16 | 24.50 | 16.80 | 17.50 | 147.00 | 19.00 | 42.00 | 50.50 | 90.16 |
| Apr. 9-11 | 24.50 | 16.80 | 17.50 | 150.50 | 19.00 | 42.00 | 50.50 | 90.16 |
| Apr. 6-7 | 24.50 | 16.80 | 17.50 | 150.00 | 19.00 | 42.00 | 50.50 | 90.16 |
| Apr. 5 | 24.50 | 16.80 | 17.50 | 149.875 | 19.00 | 42.00 | 50.50 | 90.16 |
| Apr. 4 | 24.50 | 16.80 | 17.50 | 150.00 | 19.00 | 42.00 | 50.50 | 90.16 |
| Apr. 3 | 24.50 | 16.80 | 17.50 | 149.50 | 19.00 | 42.00 | 50.50 | 90.16 |
| Apr. Avg. | 24.50 | 16.80 | 17.50 | 145.735 | 19.00 | 42.00 | 50.50 | 90.16 |
| Mar. Avg. | 24.50 | 16.80 | 17.50 | 145.730 | 19.00 | 42.00 | 50.50 | 90.16 |
| Feb. Avg. | 24.50 | 16.80 | 17.50 | 182.716 | 19.00 | 42.00 | 50.50 | 90.16 |
| Jan. Avg. | 24.50 | 16.80 | 17.50 | 171.798 | 19.00 | 35.462 | 50.50 | 88.390 |

NOTE: Copper; Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked. Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

## Sheets, Strip . . .

Sheet and Strip Prices, Page 145 & 146

**Philadelphia**—Consumers of sheets find their problems multiplying, for in addition to inability to obtain as much steel as they would like, they are confronted with a heavy volume of government paper work over the next few weeks. They are scheduled to file by May 28 form 8 under the manufacturers General Price Ceiling Regulation and by June 1 CMP form 4-B, if their products are among the 4000 individual items on List B and they expect to get steel—and copper and aluminum—in the third quarter. The latter form calls not only for production schedules but detailed material requirements.

Form 8 of the ceiling price regulation involves considerable work in the estimating of costs of labor and materials. Many consumers doubt if they will be able to get the work completed in time and there is reasonable assumption that the deadlines may have to be extended.

Actually it appears these forms can't possibly be processed much before end of June and this has given rise to the growing assumption that August as well as July mill schedules will likely follow much the same pattern as at present.

Delivery promises on DO-rated orders for carbon sheets have not been extended as rapidly as on most other major products, especially bars. Some large producers say that they can still take a little hot and cold rolled tonnage for shipment in August.

**Boston**—Additional allocations for July follow June patterns with some tonnage reductions to unrated consumers. Some volume is held open for CMP contingencies. Although schedules will be subject to revision in coming weeks, lead-time deadlines force more July scheduling. Among users of flat-rolled, stamping shops are expected to eventually benefit under CMP. Flat-rolled production will be reduced by vacations in July.

**Pittsburgh** — Producers are confused over the Controlled Materials Plan which becomes effective July 1. There is little official information concerning details. If makers are to maintain a 45-day lead time they must have the details of CMP now since theoretically rolling schedules for July should be set this week.

**Cleveland**—Cutback in automotive steel in June to 75 per cent of the industry's consumption in first half of 1950 will not result in any appreciable easing in sheet supply conditions. Auto use of steel this month is held to 80 per cent of consumption in the base period, and beginning third quarter is scheduled to drop another 5 points to 70 per cent. Pressure of demand on defense account continues to rise. Any slack attending the automotive cutback will be more than taken up by defense and related requirements. Producers are awaiting further details with respect to the Controlled Materials Plan. Also, they are withholding opening of books for unrated business beyond June until defense requirements are more fully detailed.

**Cincinnati**—Sheet mills are under pressure for deliveries. Fabricators of galvanized are hit by lowered coating schedules. The outlook is for a tighter supply situation in most cases.

**Chicago** — Build-up in defense requirements for sheets pushed farther away the months in which mills can accept further DO commitments. First openings, in the case of one producer, have shifted as follows: Galvanized sheets, from September to October; enameling iron sheets, from July to August. About two-thirds of hot-rolled sheet production is tagged for defense and defense-support end-use, and about one-third of cold-rolled sheets.

**St. Louis**—Consumers' supplies of cold rolled sheets are dwindling and pressure on the steel mills grows correspondingly greater. No real distress is reported but conversion buyers are far behind in their ingot needs. Granite City Steel has 30,000 tons of ingot orders on its books which are to come back as hot bands but is taking no new orders. Company last week made its July allocations of cold-rolled sheets, unchanged from June unless CMP demands are greater than expected.

## Plates . . .

Plate Prices, Page 145

**Boston**—Most plate tonnage on order under DO, extending through third quarter, will be confirmed under CMP and more program volume probably will be added. This will include more barge volume and liquid fuel storage requirements. Backlogs with weldment shops are larger and more heavy plates are asked to meet defense contract needs. List of fabricated structures required for defense is growing with procurement for some higher on a monthly basis. This cuts down non-rated tonnage sharply with mills frequently producing at 60 per cent on rated and program requirements.

**Philadelphia**—While plate producers don't know where they stand with regard to July schedules they don't expect CMP procedure to take hold by that time and believe distribution will be handled much the same as ratings and directives. They believe this situation will also hold for August as well. Consequently, they are adding up DO commitments, which will run heavier than in June, and are tentatively counting on about the same directive programs as heretofore.

A cut apparently is scheduled in steel for freight cars, but platemakers say they have received no word on this, or, for that matter, on anything else that would shed light on July schedules. Their deadline for July is Tuesday, May 15, but some look for this deadline to be pushed back.

**Pittsburgh**—Platemakers have little to offer non-rated consumers. Demand is increasing but sellers decline to take future orders until uncertainties attending switch to CMP are removed. Plate rolling schedules for July will be set soon. Most producers are continuing as before under the priorities plan.

**Seattle**—Smaller fabricating shops lacking work carrying DO priorities are slowing down for lack of plates. More than 2000 tons of plates are involved in 10 gas storage tanks for the Mukilteo army depot, bids to U. S. Engineer, Seattle, May 15.

## Steel Bars . . .

Bar Prices, Page 145

**Boston** — Machine tool contracts now top defense procurement in New England among metalworking industries, aircraft engines and propellers excepted. Tool steel demand is growing. Of the total market in New England, 475,000 tons last year, including carbon, alloy, stainless and reinforcing, about one fourth was alloy, tool steel and stainless bars. Currently, percentage of latter group is somewhat higher. Although bars are second only to sheets and strip, engineering report on proposed New England steel mill advised against bar production, citing difficulty in serving this bar market and current set-up for distribution. Demand for broaching bar stock is moving up.

**New York**—Bar mills are promising fourth quarter deliveries on DO-rated orders. Most of these promises actually fall in November and December on both hot carbon and cold and hot alloys. On the larger sizes they have nothing to offer before next year. The percentage for set-asides may be increased for August, but few see much chance of such an increase affecting July schedules because of the near approach of the deadline for scheduling steel for that month, even allowing for the deadline to be set back a few days as now seems probable.

**Philadelphia**—Hot carbon bar producers are at sea with regard to July schedules. They know there will be more rated work than in June and are generally confident procedure will be much along the same lines as at present. They don't know how much tonnage will be involved in directive programs, such as already are in effect and appear assured, or how much may be added.

Promises on DO-rated work now fall principally in fourth quarter and some in February of next year. The latter involves the larger sizes, 5 to 6 in. in particular, for shafting and other purposes. Rounds for shell fuses, 2-7/16 in. or thereabouts, are now being promised for November and beyond.

**Pittsburgh**—Hot - rolled and cold-finished carbon bar supplies are short. Demand has increased slightly. Hot-rolled bar scarcity is reflected in cold finished production.

Alloy bars are in critical supply. Little alloy tonnage is available for non-rated users.

**Cleveland** — Defense and related needs are taking an ever-larger bite of available bar tonnage. Hot-rolled carbon, alloy and cold-finished demand on rated account continues to mount. In alloy bars there is practically no tonnage available for unrated orders. Some relief in the tight alloy situation is afforded by resort to the leaner grades but even here difficulty is encountered. Delivery promises on bars extend as far ahead as next January in some cases.

**Chicago** — Requirements of carbon and alloy bars for rated use are mounting. Openings in producing schedules are pushed farther into the future. One maker here reports open space for hot-rolled carbon bars has slipped from September-October rolling cycle to November-December, while alloy bars have moved from July to August.

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| Cincinnati | Indianapolis | New Orleans | St. Louis | |

## Reinforcing Bars . . .

Reinforcing Bar Prices, Page 145

**Chicago**—The new NPA regulations on all types of building construction are expected to ease inquiries for concrete reinforcing materials. Jobs which are related to the defense program pretty nearly absorb all the steel the mills can put into reinforcing products.

**Seattle**—Reinforcing bar demand exceeds mill capacity here. One plant has practically withdrawn from the market. Award of 35,000 tons of bars for McNary dam is reported, tonnage being distributed among several Pacific Coast mills. Award of 1000 tons for the Whittier, Alaska, recreation center went to Bethlehem Pacific Coast Steel Corp.

## Structural Shapes . . .

Structural Shape Prices, Page 145

**New York**—Structural activity is further curtailed by the latest government steel conservation step. Construction of apartments rising more than three stories above the basement, private homes costing more than $35,000, and all public and private construction projects requiring more than 25 tons of steel now must first be authorized by the National Production Authority.

The order extends the government's building regulations over such construction as schools, churches, hospitals, highways, bridges, water and sewer systems, pipe lines and public utility and railroad projects. Only those projects for which pressing necessity can be shown are likely to gain approval.

The new regulation amends an order of Oct. 26, 1950, which banned construction of buildings for amusement, recreational or entertainment purposes.

**Boston**—District shops are confining estimates increasingly to DO inquiries. Some are looking around for direct government contracts. The Somerville, Mass., shop booked an order for steel crate sections, Naval Depot, Newport, R. I. Difficulty in obtaining steel for any project outside defense is narrowing the number of estimates. After 27,000 tons of shapes pending for bridges are placed, decline in bridge inquiry is expected.

**Philadelphia**—Further check on use of steel by the building industry will eliminate much work now in tentative stages of planning. Although some classifications have been added to those already banned, the check will not be so much on a categorical basis as on a basis of test as to how important a project may be to the general emergency program. Any project involving more than 25 tons will have to be approved by the government.

**Pittsburgh** — Inability to obtain structurals is resulting in postponment of a few building programs. This area, however, is experiencing considerable construction, both public and industrial. Demand is in excess of that which would be normal.

**Chicago**—Defense and defense-support needs currently absorb nearly all of the structural shape output. Thus it remains to be seen what effect will accrue from NPA's increased control over all types of construction. For June, just short of 100 per cent of shape production is under mill directives. Structural fabricators are obliged to confine bidding to jobs carrying ratings. First period in which one shape producer can book additional tonnage under NPA set-aside is October-November rolling cycle. Until a few days ago there were openings in the August-September cycle.

**Los Angeles**—Affected by restrictions, valuation of private and commercial construction in April slumped 19.5 per cent from March levels. Booming industrial construction sustains demand for shapes and reinforcing bars. Los Angeles county rate of current industrial construction activity is higher by 400 per cent than last year. This compares with the national increase of 66 per cent.

**San Francisco**—Expansion of Pacific Gas & Electric Co.'s Moss Landing steam plant, near Monterey, Calif., will require 1500 tons of fabricated structural steel. Wood piling of the Longview, Wash., bridge approach has been removed in favor of steel. Bethlehem Pacific Coast Steel Corp. furnished 1750 tons of fabricated structurals for the job.

**Seattle**—Fabricators expect to be busy for months on army projects in Alaska. Current backlogs are above normal and the scarcity of shapes limits bidding on large jobs. Isaacson Iron Works booked 1000 tons for the Ross dam powerhouse.

## Tubular Goods . . .

Tubular Goods Prices, Page 149

**Boston** — Approximately 125,000 tons, mostly electrically welded pipe, will be laid in New England for natural gas. This breaks down as follows: Northeastern Gas Transmission Co., 28,000 tons, 24-in., 14,000 tons, 16-in., and 13,000 tons, laterals; Algonquin Gas Transmission Co., 50,000 tons, 24 and 26-in. and 20,000 tons, laterals. Bulk of this pipe is being furnished by Claymont Steel Corp., Youngstown Sheet & Tube Co. and Republic Steel Corp. While main line tonnage has been obtained through ratings or directives, considerable volume for laterals has yet to be purchased.

**Los Angeles**—One pipe fabricator, operating at 80 per cent efficiency due to shortages of plate and skelp, is refusing 10,000 to 50,000 ft of new pipe orders monthly.

**Seattle**—Agencies for eastern cast iron pipe producers cannot meet competitive delivery schedules of western plants. Inquiry for cast pipe is normal.

## Wire . . .

Wire Prices, Page 147

**Boston**—Limited rod supply, complicated by scrap troubles, poses a major problem in the wire market. Rated orders for carbon and alloy are increasing. Mills are not above required set-asides. Allocations to consumers are contracting with June slightly under May volume for civilian consumption. Auto builders are taking all the tonnage permitted under regulations. Peak wire procurement has yet to be reached for defense, notably aircraft. Pilot orders are being placed for aircraft components. CMP will take in more wire for defense than currently. July volume to unrated consumers will be lower with frequent schedule changes likely before the new distribution plan works smoothly.

**Sunbury, Pa.**—Sunbury Wire Rope Co. added a 37-wire planetary strander to its facilities.

**Chicago**—Wiremakers are experiencing unprecedented demand for bale ties and baling wire. Heavy spring rains raised prospects for the 1951 hay crop and farmers, being forehanded, are seeking baling material. Day-to-day demand for wire fabric is beyond manufacturers' ability to accommodate and the outlook for the balance of the year is for extreme tightness.

## Warehouse . . .

Warehouse Prices, Page 151

**Cleveland**—Local warehouse operators are banking heavily on amended M-6 to materially aid them in replenishing depleted inventories beginning in June. Under this regulation the mills are obliged to provide the distributors with 85 per cent of their carbon product tonnage receipts in the first nine months of 1950. Meantime, considerable speculation is encountered as to how the Controlled Materials Plan, which becomes effective July 1, will affect the warehouses. Many observers think the trade will fare better under it than under the priorities system.

Pending development in the trade is the setting up throughout the country of designated warehouses to handle inspected aircraft alloy steels. Such a proposal has been before the government distribution authorities for some time but as yet has not been acted upon. In World War II about 15 warehouses acted as suppliers to the aircraft industry. The current proposal is that twenty distributors be designated to handle these steels. Two Cleveland warehouses are included in the list.

**Cincinnati** — Warehouses are expecting improved mill shipments in June. Conditions this month will remain unchanged with the supply situation critical against urgent demands. Available steel is being spread thin to prevent threatened shutdowns of some fabricators.

**Detroit** — A booklet explaining ways in which you can improve your "Steel-getting" chances is being distributed by Reliance Steel Division, Detroit Steel Corp., this city. It suggests "opening up" to your warehouse suppliers, telling them as much as possible about your work, giving them your detailed requirements and listing your hard-to-fill requirements with them. It recommends you anticipate your needs as far ahead as you can. It advises you to examine your specifications and relax them whenever possible. Above all, this booklet recommends close co-operation between user and warehouse.

**Philadelphia** — Warehouses are pacing sales closely to incoming shipments. In fact, they can scarcely do otherwise as inventories are so limited. Small bars, channels and plates are especially tight among the major carbon grades and anything bearing nickel is almost out of this world, particularly in the light of latest restrictions. Non-rated consumers are in a bad fix. Those who are in the middle or are nearing the end of a

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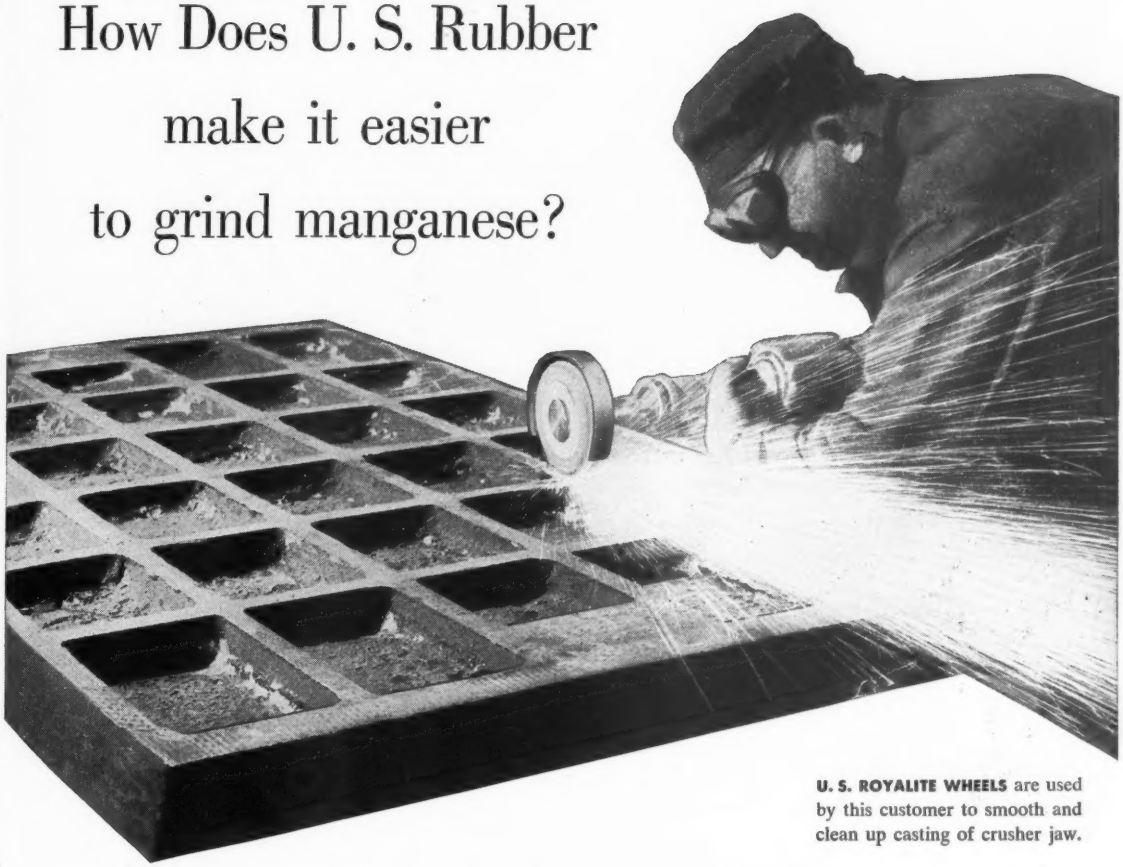

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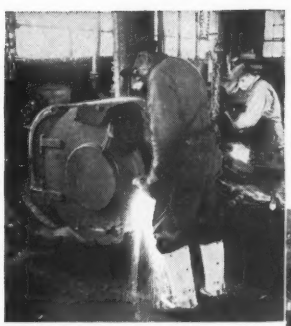

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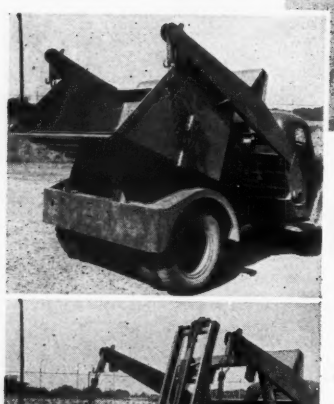
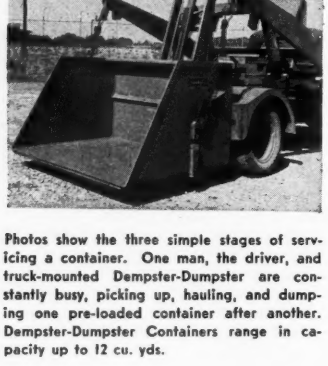




Photos show the three simple stages of servicing a container. One man, the driver, and truck-mounted Dempster-Dumpster are constantly busy, picking up, hauling, and dumping one pre-loaded container after another. Dempster-Dumpster Containers range in capacity up to 12 cu. yds.

ESSO – *recognized across the nation*

### Esso Standard Oil Company, well known for sound management, uses the Dempster-Dumpster System

Esso Standard Oil Company is among the hundreds of cost minded manufacturers, both large and small, using the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

The Dempster-Dumpster System of materials handling consists, basically, of one truck-mounted Dempster-Dumpster and any number of detachable Dempster-Dumpster Containers, which are spotted at convenient materials accumulation points inside and outside buildings. Containers are available in a wide variety of designs best suited to the type materials handled—be they bulky, light or heavy . . . solids, liquids, or dust . . . trash or rubbish.

The Dempster-Dumpster System reduces equipment together with investment and operation costs . . . eliminates standing idle time . . . eliminates re-handling of materials . . . and increases efficiency, sanitation and good "housekeeping." It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

**DEMPSTER BROTHERS, 651 Dempster Building, Knoxville 17, Tenn.**

nickel steel product assembly, are finding the situation particularly vexatious.

**Boston**—Distributors are approaching the time when effect of warehouse order providing 85 per cent of base period tonnage will be operative. Some mills will be hard put to meet allotments, notably on plates and bars. At least half of base period months were low on sales and mill orders, thus affecting allocations when demand is now much heavier. Warehouses are unable to add to inventories, steel moving out as fast as received.

**Pittsburgh**—Demand for warehouse steel is heavy but inventories are low. Receipts from producers have been fair, not sufficient to cover needs. Structural shapes and flat rolled products are in most critical supply. Bars, hot rolled, cold-finished and alloy, are in short supply but not so critical. Warehousemen expect June receipts will be higher.

## Pig Iron . . .

Pig Iron Prices, Page 144

**Pittsburgh**—Foundries are operating with dangerously low inventories of pig iron and scrap. When both iron and scrap are not available operations are curtailed. All foundries here could increase operations with existing facilities if supplies of iron and scrap would permit. Scrap shortage is more acute than pig iron but to maintain operations more iron is required. This has created a demand that is the most pressing here in years.

Pig iron production is high with only one of the 47 stacks in the area out of blast. Crucible Steel Co. expects to take a furnace at Midland, Pa., off blast in July. United States Steel Corp.'s Carrie No. 7 will be in operation around the end of this month.

**Buffalo**—Merchant pig iron shortage became more acute last week as the leading producer shut down a furnace for repairs. Another unit is expected to be down within a short time. Urgent demand continues in limited buying for defense or military requirements with automotive casters active despite a cut in motor production.

**New York**—Some district pig iron consumers have only a few days' supply on hand and confront complete suspension unless relief is provided. Appeals are being made to Washington for allocations.

Scrap supply has not reached the highly critical stage, in the opinion of some foundrymen, but increasing difficulty in obtaining ferroalloys is complicating extended use of scrap in some cases. Ferroalloys are used to sweeten the mix especially where an abnormal charge of scrap is being used. In some cases foundries are now using as little as 8 to 10 per cent of iron in the mix for the reason that they can't get more.

**Boston** — Ore arrivals at Mystic Furnace are heavier with reserves building up. Collier operated by Mystic Steamship Co. arrived recently with a large cargo which included Wabana ore. Demand for pig iron holds with foundries getting a more even flow of tonnage than consumers of basic. Domestic supply from New York and other points has been supplemented by additional purchases of foreign basic.

**Philadelphia**—The outlook for pig iron is increasingly critical due to further shrinkage of offerings from abroad. A modest shipment of Chilean iron arrived here recently but there is question as to when more will be received. Meanwhile offerings of several thousand tons of Turkish basic at $71 c.i.f. have been withdrawn. There is talk of this iron being offered at $5 or so a ton higher for delivery in four to five months.

**Cleveland**—Foundry operations here are maintained on a high level despite increasing pig iron shortage. Some shops operate five days one week and six days the next, alternately short and long weeks being found more agreeable to workmen than a straight 6-day schedule.

Concern over supplies is rising as defense business mounts. Bulk of castings business, however, still is on civilian account. Machine tool castings demand is noticeably more active, some shops on such work pushing production to the limit of raw material supplies. Merchant iron sellers are scheduling deliveries so that no foundries are forced to curtail drastically. However, few shops are able to accumulate the maximum inventories permitted by government control authorities.

**Cincinnati**—District foundries are uncertain whether they can hold the present melting level. Those recently bolstering schedules through use of foreign iron are likely to rely henceforth on whatever domestic iron is allocated using, of course, a maximum proportion of scrap. Considerable curtailment of domestic needs would be required to produce any easing in supplies of pig iron.

**Los Angeles**—With imports of pig iron from Germany, Holland, and India tapering, and iron stocks at hand-to-mouth levels, some foundries are on the brink of shutdown.

**San Francisco**—Kaiser's idle blast furnace near Provo, Utah, is reported being sought by an unnamed buyer. When the stack, of 600 tons capacity, was operated by Kaiser, some of the iron was sold in the merchant market.

## Metallurgical Coke . . .

Metallurgical Coke Prices, Page 149

**Pittsburgh**—Beehive furnace coke is in good supply but a tightening is expected late this month when a blast furnace now down for repairs is blown in. Byproduct foundry coke demand is heavy. One seller here states the shortage of scrap and pig iron has relieved pressure on the coke market to some extent. Eastern districts experience an easier coke situation than this area and those farther west. Use of natural gas in the East in place of water gas has freed coke for other purposes and relieved the eastern markets.

**Cleveland**—Demand pressure for coke is slightly easier in this area though consumption continues heavy. Substantial tonnages of outside oven coke are coming into this district, including some from New England. Connellsville beehive coke is being used to supplement normal oven coke supplies. Beehive tonnage is smaller than some time back, however. The market is firm at levels established in January.

## Iron Ore . . .

Iron Ore Prices, Page 151

**Cleveland**—Lake Superior iron ore average daily loading rate has reached 380,894 tons at United States ports. Shipments for the week ended May 7 totaled 2,726,289 tons, making the cumulative season total 8,665,609 tons against 1,462,020 tons a year ago. Shipments from Canadian ports to date this season total 144,127 tons.

## Scrap . . .

Scrap Prices, Page 152

**Chicago**—Scrap inventories at several mills are approaching the two week minimum which qualifies applications to NPA for allocations. Large shipments out of this district to eastern consumers in recent weeks are the cause of current distress here. Overall scrap flow is not up to expectations and is giving rise to concern as to how long steelmaking operations can be sustained at over capacity level. Equally disconcerting is the shortage of cast grades required by foundries. Melters are obliged to bring in scrap from considerable distances with attendant high transportation costs.

**New York**—Movement of scrap has slowed up appreciably, dealers explaining that sources for yard scrap are beginning to dry up. Thus, consumer inventories are being adversely affected. Few district foundries now have as much stock as they had a week ago and this situation combined with the decline in the movement of pig iron, may result in early suspensions at some plants.

Pressure pipe interests met in Washington last Thursday to urge a revision in price schedules, if such should seem necessary to stop the practice of upgrading.

**Boston** — Allocations from dealer yards include numerous grades in addition to heavy melting steel. Steel scrap inventories at yards could soon be depleted as incoming tonnage is below seasonal level despite higher prices paid for light material, unprepared heavy melting and mixed cast. Steelworks describe the scrap situation as only fair. Demand for cast scrap is heavier, both for district consumption and outside.

**Philadelphia**—Upgrading continues in scrap, with the trade increasingly convinced the only way this practice can be stopped is for Washington to establish one flat price for the four major steel grades and one for the principal cast grade. Shipments are a shade easier but consumers' inventories show little improvement. One steel mill has again had to take off an open hearth furnace because of shortage of scrap.

**Buffalo**—Ingot production may be cut soon because of a scrap shortage. Stocks are down to a 21-day level and current receipts are not sufficient to replenish them. Minor improvement has been noted in the flow of industrial scrap, but cast is scarce.

**Pittsburgh** — Collections are improved but demand for scrap has increased at a greater rate. Many foundries face complete halt in operations if scrap supply does not improve. Inventories as low as one and two days are not uncommon.

Much scrap being collected is light and must be processed requiring time

and manpower. Collections of heavy scrap have fallen slightly.

Attempts to make the public scrap-conscious have resulted in the organization of a steel scrap salvage advertising campaign.

**Cleveland**—Mills are exerting more pressure on their suppliers for larger scrap shipments to support peak melting operations. Bulk of material in this area is moving on direct allocation or is earmarked at its source for return to a particular mill. Foundries have unusually small inventories and have obtained only small tonnages on allocation.

**Detroit**—Pick-up in country scrap collections and relatively high level of industrial activity is improving this area's scrap picture. Although mills complain that high operations are at the expense of inventory, scrap procurement by several mills is on a fairly even keel. Foundries are having a desperate time. The shortage is due in part to the fact that machinery and tool scrappage is at an extremely low level.

**Cincinnati**—Scrap suppliers are extending themselves to get in adequate tonnage. Under present demand distant hauls are no barrier. Dealers are getting more material, principally light grades.

**St. Louis** — Scrap consumers are cutting deeper into already low ground stocks as shipments continue behind daily melts. The deficit is dropping a little, however, as better weather aids scrap inflow to the district. Foundries are more hard pressed than most of the steel mills and more dealer scrap is going under allocation.

**Los Angeles** — With requirements estimated at 60,000 tons, Geneva Steel Co. is scouring this district for all grades of steelmaking scrap to replenish yard stocks. Reduced scrap generation pushed collections down 30 to 40 per cent in the last 90 days.

**San Francisco** — Scrap supply is tightening, partly because of slower scrapping of industrial machinery.

**Seattle**—Steel scrap outlook is improved with increased country collections. Electric furnace grades are short. No additional foreign material is scheduled for early delivery here.

## Refractories . . .

Refractories Prices, Page 151

**Pittsburgh** — Coke oven construction programs are causing a shortage of silica brick in this area. Neutral and basic grades are in limited supply. Normal open-hearth repairs plus construction of new furnaces contribute to the scarcity of basic brick.

## Ferroalloys . . .

Ferroalloy Prices, Page 151

**Washington**—Dollar-and-cents ceiling prices on ferrotungsten and other tungsten products were effected May 7 by the Office of Price Stabilization under ceiling price regulation 33.

The new ceilings represent an increase over prices frozen by the general ceiling price regulation of Jan. 26, reflecting part of the higher cost of tungsten concentrates, on which a ceiling price of $65 per short ton unit was placed by OPS on Apr. 6.

The current ferrotungsten order is an interim measure.

Typical ceiling prices set by the order are $5 per pound for standard grade ferrotungsten in quantities of 10,000 pounds or more, compared with $3.25 previously, and $6 per pound for carbon-reduced tungsten metal powder in quantities of 1000 pounds or more, compared with around $4.25 previously.

Ceilings for other products in large volume are $7.75 per pound for hydrogen-reduced tungsten metal powder, $4.30 for tungstic acid, $4.65 for tungstic oxide, $4.15 for ammonium paratungstate, $3.15 for sodium tungstate crystals, and $3.55 for sodium tungstate anhydrous. Slightly higher prices apply on sales for smaller quantities.

## Rails, Cars . . .

Track Material Prices, Page 147

**New York**—Domestic freight car orders for 6228 units placed in April brought backlogs as of the beginning of this month to 155,871. Since outbreak of hostilities in Korea, the railroads have ordered 175,950 cars.

Deliveries in April totaled 8,274, increase of 18 per cent above March, and 41 per cent above February.

A breakdown of cars ordered and delivered in April and of the backlog of cars on order as of May 1 follows:

| | APRIL, 1951 | | |
|---|---|---|---|
| Type | Ordered April 1951 | Delivered April 1951 | On Order & Undelivered May 1, 1951 |
| Box—Plain | 1,367 | 3,967 | 52,556 |
| Box—Auto | .... | 254 | 1,830 |
| Flat | 16 | 209 | 3,866 |
| Gondola | 208 | 1,595 | 32,468 |
| Hopper | 3,538 | 1,249 | 40,156 |
| Covered Hopper | 285 | 265 | 4,932 |
| Refrigerator | 200 | 279 | 7,681 |
| Stock | .... | .... | 500 |
| Tank | 608 | 300 | 10,412 |
| Caboose | 6 | 38 | 511 |
| Other | .... | 118 | 959 |
| TOTAL | 6,228 | 8,274 | 155,871 |
| Carbuilders | 1,776 | 5,781 | 109,024 |
| Railroad Shops. | 4,452 | 2,493 | 46,847 |

**Philadelphia** — Pennsylvania railroad is placing orders for 132 diesel electric locomotives, costing about $45 million. The locomotives will be in addition to a fleet of 1036 diesel engines now in service or on order for delivery by not later than August.

## STRUCTURAL SHAPES . . .

### STRUCTURAL STEEL PLACED

2000 tons, shop building, Norton Co., Worcester, Mass., to O. A. Wilson Structural Co., Cambridge, Mass.; Gilbane Building Co., Providence, R. I., general contractor.

1000 tons, Seattle's Ross dam powerhouse, to Isaacson Iron Works, Seattle.

500 tons, plant construction, Sylvania Electric Products Co., Towanda, Pa., to Milton Steel Supply Co., Milton, Pa.

400 tons, annealing and furnace building, General Steel Castings Co., Eddystone, Pa., through Irwin & Leighton, Philadelphia, to Belmont Iron Works, Eddystone.

130 tons, addition, Universal-Rundall Corp., Camden, Pa., to Robinson Steel Co., Philadelphia.

### STRUCTURAL STEEL PENDING

200 tons or more, emergency gates, Lookout Point dam, Oregon; Willamette Iron & Steel Co., Portland, low.

200 tons, also 100 tons reinforcing, Seward-Anchorage road project; bids to Bureau Public Roads, Juneau, Alaska, May 24.

100 tons, barracks and facilities, air base, Limestone, Me.; Volpe Construction Co., Boston, general contractor.

Unstated, five shop buildings, Fort Richardson, Alaska; Valle-Sommers Co., Seattle, low $2,907,717.

Unstated, steel frame repair shop, Anchorage, Alaska; J. C. Boespflug Construction Co., Seattle, low $895,476 to Alaska Railroad.

## REINFORCING BARS . . .

### REINFORCING BARS PLACED

35,000 tons, completion McNary dam, Oregon, to various producers, including Northwest Steel Rolling Mills Inc., Seattle; Atkinson-Ostrander-Jones joint contractors.

1000 tons, recreational center Whittier, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Haddock Engineers, Seattle, general contractor.

650 tons, Dorrance laboratory, Massachusetts Institute of Technology, Cambridge, Mass., to Concrete Steel Co., Boston; Sawyer Construction Co., Boston, general contractor.

330 tons, Minnetonka high school, Excelsior, Minn., to United States Steel Supply Co., Chicago.

250 tons, Atomic Energy Commission bridge, Richland, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle; Manson Construction & Engrg. Co., Seattle, general contractor.

210 tons, post office garage, Milwaukee, to United States Steel Supply Co., Chicago.

185 tons, elementary school, Huron, O., to Hausman Steel Co. Inc., Toledo, O.

### REINFORCING BARS PENDING

1200 tons, apartment building, S. 74th street and Lake Shore drive, Chicago.

605 tons, including 255 tons for substructure and 350 tons for deck, contracts E-1 and E-3, Central Artery, Boston; bids May 15.

270 tons, factory, Hachmeister Inc., Allegheny county, Pennsylvania.

210 tons, Aeroproducts Co., Vandalia, O.

210 tons, West Senior high school, Aurora, Ill.

150 tons, airport construction, O'Hare field, Chicago.

Unstated, 162-foot state bridge, Roosevelt county, Montana; bids to Helena, May 10.

## PLATES . . .

### PLATES PENDING

2000 tons or more, eight 80,000-barrel and two 55,000-barrel gas storage tanks, Mukilteo, Wash. government depot; bids to U. S. Engineer, Seattle, May 15.

100 tons or more, 500,000-gallon elevated tank, Fort Lauderdale, Fla.; bids May 21; alternate on reinforced concrete.

Unstated, 18 fuel storage tanks, total capacity 10,700 barrels, for Kodiak, Alaska, naval base; bids to Navy District, San Francisco, May 9 (government furnishes steel).

Unstated, 13 steel storage tanks, total capacity of 1100 barrels; bids to Federal Supply Service, Seattle, May 16.

## PIPE . . .

### CAST IRON PIPE PLACED

182 tons, system expansion, Corvallis, Oreg., to Pacific States Cast Iron Pipe Co., Provo, Utah.

125 tons, system expansion, Medford, Oreg., to Pacific States Cast Iron Pipe Co., Provo, Utah.

### CAST IRON PIPE PENDING

Unstated, 10,000 feet 8 to 4 inch (alternatives invited); bids to F. A. Reil, city clerk, Redmond, Wash., May 9.

### STEEL PIPE PLACED

200 tons, fabricated pipe, Philadelphia Gas Works Co., Philadelphia, to Reliance Products Co., McKeesport, Pa.

### STEEL PIPE PENDING

Unstated, 2560 feet 10 to 6 inch, 10 gage; bids in to Kenneth Crossler, city clerk, Dayton, Wash., May 8.

Unstated, 2200 feet, 6 to 3 inch and utilities, for Fairchild air force base, Spokane, Wash.; bids to U. S. Engineer, Walla Walla, Wash., May 16.

## RAILS, CARS . . .

### LOCOMOTIVES PLACED

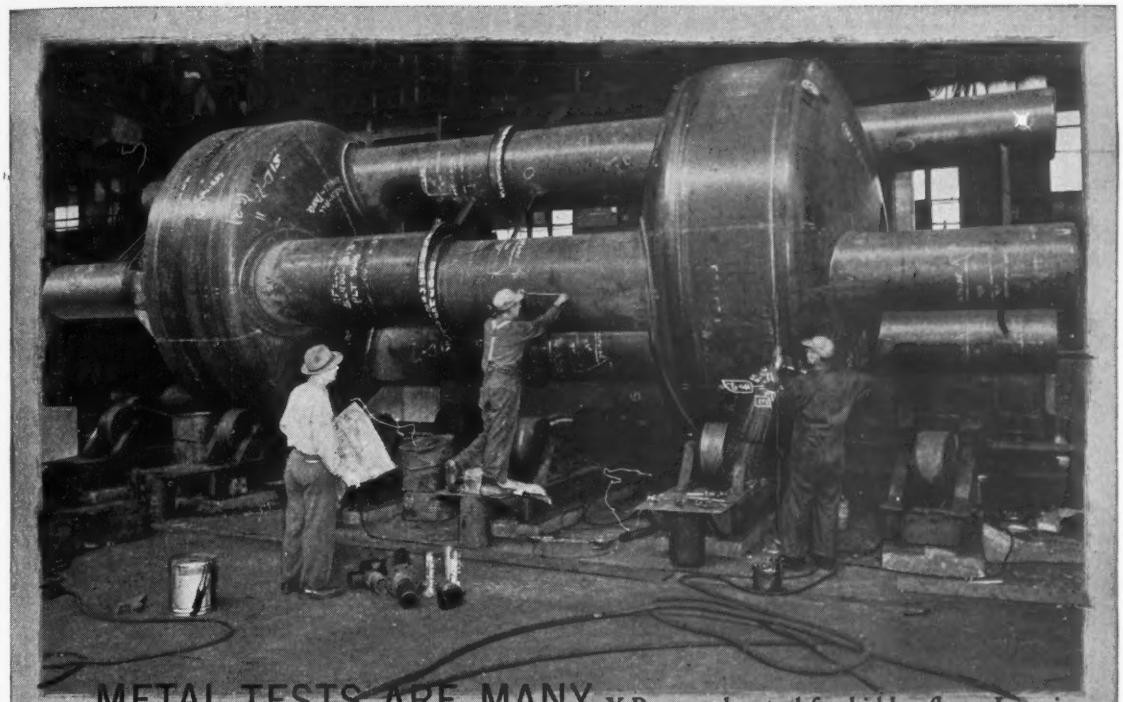
Army Transportation Corps, forty-one 800-hp diesel switching locomotives, to Electro-Motive Division, General Motors Corp., Detroit.

### RAILROAD CARS PLACED

Canadian National, 75 hopper cars, to National Steel Car Corp. Ltd., Hamilton, Ont.

### RAILROAD CARS PENDING

New York, New Haven & Hartford, 550 seventy-ton hopper cars; bids asked.



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## —THEY LAST 3 TO 12 TIMES LONGER THAN ORDINARY FANS ON CORROSIVE FUMES

No metal is exposed to the corrosive fumes being handled, because of the rubber lining "welded" to all interior parts by the special *Vulcalok* process. Hard or medium hard rubber is used according to the fumes specified.

It's one of many types of "Buffalo" steel plate exhausters designed for special applications in fume handling. There's one ready to give you cheapest and most effective service on your "problem" air handling job.

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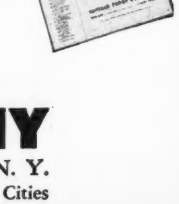


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# Metalworking Briefs . . .

**CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES**

### Enlarges Ferroalloy Plant

St. Lawrence Alloys & Metals Ltd., Beauharnois, Que., will enlarge production facilities of its ferroalloy plant at a cost of about $3 million. Ground has been broken for a new furnace building, in which two covered electric furnaces of 12,000 kilowatt capacity will be installed. At present the company is operating 13 small furnaces. A new mix-house addition also will be erected, along with other facilities for production of ferroalloys. The program is scheduled to be completed in the spring of 1952.

### Will Operate Bomb Plant

National Gypsum Co. Inc., Buffalo, will operate the $30 million Nebraska Ordnance plant at Wahoo, Nebr. Production of demolition bombs is scheduled to start within a month.

### Republic Supply Co. Expands

Republic Supply Co. of California, Los Angeles, is speeding construction of its northern division main headquarters at San Leandro, Calif. The new plant and pipeyard will occupy ten acres. Plans call for offices and warehouse beside the pipeyard.

### Latrobe Moves Branch Office

Latrobe Electric Steel Co., Latrobe, Pa., moved its Chicago branch office and warehouse to its newly built quarters at 2006 N. Hawthorne Ave., Melrose Park, Ill. F. E. Allison continues as district manager.

### Pittsburgh Gear Co. Sold

A syndicate of Chicago and Peoria, Ill., businessmen acquired Pittsburgh Gear Co., Pittsburgh, manufacturer of gears and pinions for the steel, mining and other industries.

### General Refractories Expands

General Refractories Co., Philadelphia, is enlarging capacity of its Brooklyn, Md., plant by about 40 per cent. Included in this program, which is for its nonburned brick department, is a one-story building for the storage of magnesite. The company also will build and provide cover for several large steel tanks of sufficient capacity to store 25,000 tons of chrome ore. Four new presses will be installed in space now available.

### Offers More Industrial Items

To provide a more complete service to those companies doing lapping, polishing or fine finishing, Industrial Products Division, Elgin National Watch Co., Elgin, Ill., now offers a complete line of accessories to be used with its diamond compound. Included are felt bobs and wheels, abrasive stones, polishing brushes, wood lapping sticks and wheels. They are specially selected for use on plastic molds, carbide dies, drawing and forming dies, and precision parts.

### Advance Tool Moves Plant

Advance Tool Co., designer and manufacturer of high production dies and small tools, moved into a new plant, containing about double its former space, on Joppa road and Satyr Hill avenue, Baltimore. Philip V. Miceli is owner.

### Alter Co. Expands Smelter

Alter Co., Davenport, Iowa, is expanding its copper and nickel smelting plant through construction of an addition providing 15,000 square feet. Completion is scheduled for Sept. 1.

### Cooper Forms New Division

An Aircraft Castings Division was organized by Cooper Alloy Foundry Co., Hillside, N. J. The division will produce stainless and other high-alloy castings demanded by the jet, rocket and guided missile programs.

### Buys Interest in Tool Firm

Magna Engineering Corp., San Francisco, purchased 50 per cent of the capital stock of Production Engineering Co., Berkeley, Calif., manufacturer of power tools and other hardware products.

### The Texas Co. Plans Terminal

The Texas Co. is expected to order construction begun by Aug. 1 on a $3.5 million marine terminal on a 25 acre site purchased two years ago from Parr Terminal Co., Richmond, Calif. The terminal facilities to be built in Richmond's inner harbor are said to include dockage, warehouse and tankage for oil operations.

### Will Re-equip Dry Ice Plant

Air Reduction Co. Inc., New York, will spend $1.5 million for a plant in Niagara Falls, N. Y., for the manufacture of dry ice. The company is taking over the old dry ice plant of Union Carbide & Carbon Corp. and re-equipping it.

### Whiton Names Agents

Whiton Machine Co., New London, Conn., manufacturer of lathe chucks and centering machines, appointed the following representatives: Port Huron Equipment Co., Port Huron, Mich.; Melson Industrial Supply Co., Grand Rapids, Mich.; Olsen-Sansom & Co., Detroit; Sterling Products Co., Moline, Ill.

### Union Oil To Spend Millions

Union Oil Company of California, Los Angeles, received a Certificate of Necessity from the National Security Resources Board for $16.5 million to rehabilitate


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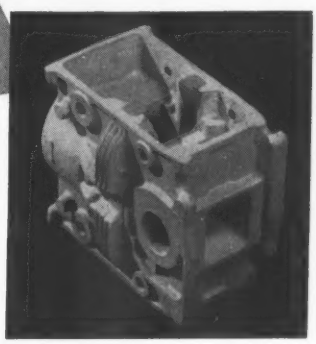

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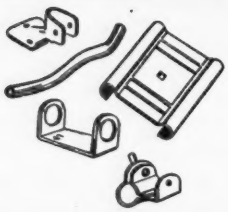
ALCOA ALUMINUM CASTINGS

# METAL *Fabricating*



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old machinery and add facilities for production of gasoline, gasoline components and fuel oil.

### Allen-Scott Builds Plant

Allen-Scott Co. Inc., Los Angeles, is constructing a $200,000 plant at the Los Angeles International Airport industrial tract for manufacture and repair of aircraft instruments. Completion is scheduled by June 1.

### Sprague Equips Wire Plant

Sprague Electric Co., North Adams, Mass., purchased a mill in Bennington, Vt., which will be used to expand its facilities for making high-temperature magnet wire. Rebuilding of the factory and installation of equipment is now under way. Production is scheduled to begin in late summer.

### Sterling Machinery Sold

Essick Mfg. Co., Los Angeles, bought the Sterling Machinery Corp., Kansas City, Mo., and moved all operations of the firm to Los Angeles. The Kansas City office and plant have been closed.

### Caldwell Mfg. Moves Offices

Caldwell Mfg. Co. moved its offices and production facilities to its new building at 64 Commercial St., Rochester, N. Y.

### Philco Opens Coast Office

Government and Industrial Division, Philco Corp., Philadelphia, is establishing an office at 260 S. Beverly Drive, Beverly Hills, Calif., with E. F. Harbison as manager. This office will be the headquarters for contacts on the Pacific Coast for such phases of the national security program as guided missiles, torpedoes, radar and associated electronic devices. It will also serve as the focal point for sale of Philco microwave relays for communications and television.

### Eidal Opens Axle Plant

An axle fabricating plant was opened by Eidal Mfg. Co., Albuquerque, N. Mex., in Phoenix, Ariz., under the name of Western Axle Mfg. Co. It is located in an old machine shop at the Arizona Iron Works.

### Noma Buys Burner Firm

Noma Electric Corp., New York, acquired Automatic Burner Corp., Chicago. Present plans call for expansion of the latter company which will be operated as a wholly-owned subsidiary.

### Abrasive Producer Expands

Cleveland Metal Abrasive Co., Cleveland, is completing construction of an addition to its plant in that city. New equipment being installed includes additional normalizing furnaces, wire cutting equipment, and crushing rolls for the production of hard iron grit.

### Thompson Trailer Moves

Thompson Trailer Corp. is moving its plant from Alexandria, Va., into the former plant of Maryland Engineering Co., Greenwood Rd., Pikesville, Md. The company specializes in the building of aluminum commercial trailers including specialized truck bodies used by public utilities. The company expects to be in production within a few weeks.

### Tach-Fast Gets Larger Plant

Tach-Fast Mfg. Co., manufacturer of metal runners to sustain acoustical ceilings, moved to 307 Camel St., Baltimore, thus doubling the space it formerly occupied.

### New Allis-Chalmers Agent

Allis-Chalmers Mfg. Co., Milwaukee, appointed Plant Service Co., Boston, as a dealer for its motors, controls, drive equipment and pumps in Suffolk county, Massachusetts.

### Airmac Opens Machine Shop

Airmac Manufacturers Inc., Baltimore, equipped several thousand square feet at 4730 Reisterstown Rd., for machine shop work, particularly airplane small parts.

### Ansco Diversifies Output

A large section of the Ansco camera plant in Binghamton, N.Y., will be converted to the production of electronic equipment.

### Plant Will Make Shell Cases

General Services Administration is turning over to the Army the government-owned former aluminum reduction plant at Riverbank, Calif. The plant, operated by Aluminum Co. of America during World War II, will be used for the manufacture of steel shell

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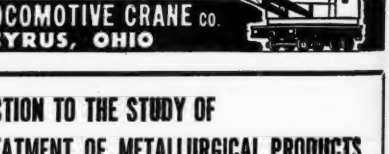

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cases. Major part of the equipment in the plant has been sold and installed elsewhere to increase the country's output of aluminum.

### White Buys Sterling Motor

An agreement has been reached for the purchase of substantially all of the assets of Sterling Motor Truck Co., Milwaukee, by White Motor Co., Cleveland. The agreement is subject to approval of Sterling stockholders. White plans to continue operations at the Milwaukee plant. Sterling specializes in heavy-duty, off-the-highway gas and diesel trucks engineered for service in construction, mining, and similar operations.

### Lamp Firm Buys in Warren

Silver Lamp Co. purchased a plant building in Warren, Pa., where it will concentrate all lamp and lighting fixture production. The firm expects to triple its manufacturing output in the new quarters.

### Harvester Awards Contracts

Most of the major contracts for construction of a building at 46th and Colorado boulevard, Denver, which will house International Harvester Co.'s service parts depot and a general sales district office and warehouse, have been awarded. The building project will cost about $1.5 million.

### Issues Al-Fin License

A license for the manufacture of bi-metallic automotive components through use of the Al-Fin process was granted to Aluminiumwerke Nürnberg, Nürnberg, Germany, by Fairchild Engine & Airplane Corp., Hagerstown, Md.

### Welding Firm Opens Plant

Big Three Welding Equipment Co., manufacturer of oxygen and dealer for Lincoln Electric Co., Cleveland, opened new headquarters in Houston.

### Transitier Appoints Agent

E. C. Buehrer Associates Inc., San Francisco, was appointed distributor in that area for lift trucks manufactured by Transitier Truck Co., Portland, Oreg.

### Tracerlab To Boost Output

Tracerlab Inc., Boston, leased the sixth floor at 286 Congress St., that city, primarily for electronic instrument assembly. One of the principal items to be produced is the Radiac which detects and measures medium level gamma radiation.

### Closes Canadian Plant

Twin Coach Co., Kent. O., is suspending operations in its Ft. Erie, Ont., plant. A lack of plant space was blamed for the suspension.

### Plans $3.8 Million Plant

Construction of a $3.8 million plant in North Hempstead, Long Island, New York, is planned by Lewyt Corp., Brooklyn, N. Y., manufacturer of vacuum cleaners and contract manufacturer of other goods. The plant will turn out a variety of electronic and electromechanical devices, such as radio communications equipment, radar devices and precision mechanical assemblies, for the armed services.

### Trailmobile Opens Branch

Opening of a factory branch in Memphis, Tenn., is announced by Trailmobile Co., Cincinnati. Paul W. Campbell, formerly manager of the company's factory branch in Little Rock, Ark., is manager.

### Precision Metal Moves

Precision Metal Mfg. Co., Utica, N.Y., is shifting its operations to a leased factory building in Ilion, N.Y. The firm makes screw machine products and other small parts. Frank Vescere is head of the company.

### Cayuga Machine Organized

Cayuga Machine & Fabricating Co. Inc., Buffalo, was incorporated with stock of 200 shares. Incorporators are Byrns E. E. Long, Harry J. Bichsel and Edward C. Neff.

### Demand for Presses Soars

A record-breaking backlog of orders is now on the books of Lake Erie Engineering Corp., Buffalo. Orders have more than doubled since January and the volume is continuing to mount as a result of the heavy demand for presses. The company is considering broadening its expansion program beyond the previously announced $1 million figure. Construction of an addition to the present plant is planned, and additional manufacturing facilities may be erected elsewhere. About 80 per cent of the firm's current business is of the defense variety.

### $3 Million Expansion Planned

Alloys & Metals Ltd. of Canada, Montreal, is expanding its plant in Beauharnois, Que., near Montreal. The $3 million program will boost plant capacity by 40 per cent.

### Battery Firm Moves Offices

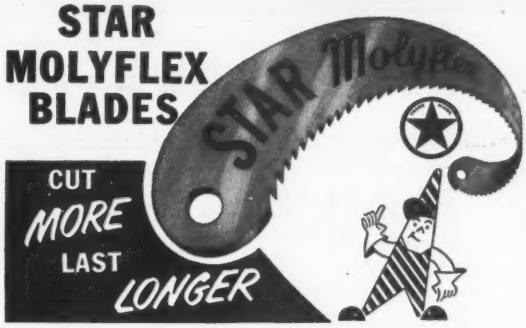
Electric Storage Battery Co. moved its general offices, except manufacturing and engineering departments, to 42 S. 15th St., Philadelphia 2.

### Duraloy Opens Detroit Office

A Detroit sales office was opened by Duraloy Co., Scottdale, Pa., producer of high-alloy static and centrifugal castings. W. D. Hazleton is manager of the direct sales branch, located at 805 New Center Bldg.

### Crobalt Appoints Agents

Crobalt Inc., Ann Arbor, Mich., appointed the following as distributors for its cast-alloy cutting tools: H. G. Bissell, Lebanon, O.; MacInnes Steel Sales Co., Erie, Pa.; Eugene Roth Inc., New York; H. J. Scheid & Co., Philadelphia; United Industries Co., Long Beach, Calif.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Plug Mills
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Pilers
Side Trimmers
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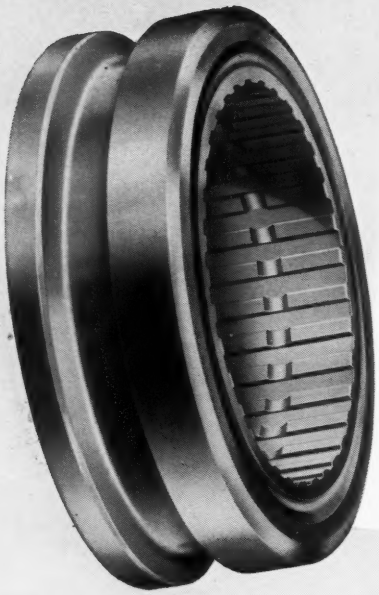

| COST WHEN MADE FROM FORGINGS—$1.714 | | COST WHEN MADE FROM TIMKEN TUBING—$1.47 | |
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| Cost of forging per unit. . . . . | $0.4228 | Cost of tubing per unit. . . . . | $0.293 |
| Production cost per unit (broached and then machined on chucking automatic). | $1.2912 | Production cost per unit (with mill-length tubing on 4-spindle 5″ capacity automatic screw machine) . . | $1.177 |
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